Can Self-Affirmation Reduce Defensive Responses to Health Communication Messages? – The Role of Self-esteem

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Dedication

To my mother, Pingping Jiang, and to my father, Jisheng Zhu,

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Abstract

This dissertation tested whether people's strength of self-esteem moderates self-affirmation effects on health message processing. The findings from three studies (Study 1: $N = 115$, Study 2: $N = 294$, Study 3: $N = 426$) with three different behavior contexts (sunscreen use, flossing, and alcohol consumption reduction) suggest that individuals' strength of self-esteem can moderate self-affirmation effects on health message processing: people with high and low levels of self-esteem may respond differently to self-affirmation based health communication interventions in certain situations. However, despite the theoretical coherence, evident inconsistencies exist across the three studies. Therefore, at this point, I cannot reach a clear conclusion regarding when self-affirmation benefit people with high versus low levels of self-esteem and cannot provide specific suggestions on how self-affirmation should be used in health communication practices. Nonetheless, this research has shown that individuals' self-esteem levels can influence the effectiveness of self-affirmation-based health communication interventions, and sometimes not in a desirable direction. Interventionists therefore should use caution when incorporating self-affirmation elements in health communication interventions as it may have positive effects for some, but weak or even adverse effects among others.

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INTRODUCTION: OVERVIEW OF DISSERTATION

Imagine you just finished renovating your home and you are very pleased with the end result. A person walks up to you and starts criticizing every single change you have made. How would you feel? What would be your response? Will you listen carefully to see whether the person's critique has any merits, will you quickly turn the person away, or will you engage in an argument with the person to try to prove that he or she is wrong? Surely this absurd scenario rarely happens in daily life, but from experience, we know how we would feel and respond at a moment like this: it is highly possible that we would either turn the person away or refute each and every piece of critique the person made.

Resisting information that challenges our existing valued beliefs is not uncommon in everyday life. In the health communication domain, there is good evidence that people often ignore and/or reject accurate and well-intended health messages that suggest their current behaviors may impair their health and that they can be heathier by making behavior changes. Resistance to health messages presents a critical barrier to promoting individual and population health, because people who are most at risk are typically the least persuaded by health messages. Self-affirmation theory suggests that such responses are driven by a fundamental human motive to protect a sense of the self being adaptively and morally adequate (Steele, 1988). If people are giving an opportunity to reflect on unthreatened, cherished values or personal attributes, they can secure the sense of self-worth and increase openness to personally relevant health messages.

Whilst a mounting body of evidence attests to the benefits of self-affirmation, it is noteworthy that the reported effects are small and not always consistent (e.g., Cohen & Sherman, 2014; Epton, et al., 2015). A potential moderator that bears close conceptual relevance with self-affirmation and has important associations with health outcomes is self-esteem, people's global evaluation or attitude about themselves (Rosenberg, 1965). Self-esteem's moderating role on self-affirmation effects has yet to be comprehensively tested in the health communication context despite its critical implications for health intervention design – it may explain when self-affirmation-based health interventions may have positive effects for some, but weak or even adverse effects among others.

To start filling this gap in the literature, the present research examines whether people's strength of self-esteem moderates the effectiveness of self-affirmation based health communication messages and proposes circumstances in which self-affirmation would produce differential effects for people with high and low levels of self-esteem.

Chapter 1 of this dissertation provides a review of the literature on defensive processing, self-affirmation theory, and self-esteem in the health communication context. I start Chapter 1 by clarifying the conceptualization of defensive processing with regard to health message processing. The mechanisms underlying defensive processing is unpacked to provide a foundation for following discussions on solution to defensive processing. Next, the root cause of defensive processing, i.e., the maintenance and perpetuation of self, is explained. In this section, I review relevant literature about the self, including the conceptualization of the self, properties of self-knowledge, and

people's fundamental motivation to preserve the self. Afterwards, I discuss self-affirmation theory as a solution to defensive processing and its applications in the health communication context. Then, I outline the unanswered questions and argue that self-esteem is a critical individual difference factor that can moderate the effectiveness of self-affirmation manipulations on reducing defensive responses towards health messages. Research on the role of self-esteem in self-affirmation research is reviewed and three possibilities regarding the role of self-esteem are analyzed. Last, I propose three studies to examine the circumstances under which people's strengths of self-esteem matter for self-affirmation effects in the health communication context.

Chapter 2 of this dissertation reports study 1 (N = 115). This study tests whether the proposition that self-esteem functions as resource and that self-affirmation enlarges disparities between people with high and low levels of self-esteem, applies in a health communication context where an autonomy threat is induced by a health message with controlling language.

Chapter 3 of this dissertation reports study 2 (N = 294). This study examines whether the extent to which self-affirmation manipulation secured participants' sense of self-integrity (i.e., adequacy of self-affirmation) determines when people with high versus low levels of self-esteem benefits from self-affirmation manipulation.

Chapter 4 of this dissertation reports study 3 (N = 426). This study tests whether induce self-affirmation *before* versus *after* the onset of a threat to the self (i.e., health message exposure) determines whether self-esteem functions as *resources* or functions as

expectancies and produces differential effects for people with high and low levels of self-esteem. The final chapter (Chapter 5) presents an overview of the research findings of the studies and discusses the theoretical and practical implications.

CHAPTER 1: THEORETICAL BACKGROUND

Defensive Processing of Health Messages

What is Defensive Processing?

Health communication messages are designed to persuade people to adopt healthy behaviors or to avoid unhealthy ones. Unfortunately, however, not all of them succeed in achieving the desired outcomes (e.g., Wakefield, Loken, & Hornik, 2010) and some even result in unintended adverse consequences (e.g., Byrne & Hart, 2009). For example, the US National Youth Anti-Drug Media Campaign that ran from 1999 to 2004, for which the U.S. Congress appropriated nearly $1 billion, not only failed to show desired effects on reducing youth's marijuana use, but may have increased youth's pro-marijuana cognitions and lowered their intention to avoid marijuana use (Hornik et al., 2008).

Typically, a health message informs people that their current behaviors are putting their health at risk and that they should change their behaviors to be healthier. Some health messages use strong language and graphic images to emphasize the health risks, expecting people to be motivated to engage in protective actions by the fear of the potential harm (e.g., Janis & Feshbach, 1953; Peters, Ruiter, & Kok, 2014). However, there is good evidence that fear-inducing health messages are often ineffective, particularly when efficacy components are absent (e.g., Anderson, 2010; Ruiter et al., 2014; Witte & Allen, 2000) and some can even be counter-productive (e.g., Albarracin et al., 2005; Brown & Locker, 2009; Thompson, Barnett, & Pearce, 2009). In response to

these fear-inducing messages, people often refute the message's arguments, derogate the message source, downplay the seriousness of the health risks, and/or deny the personal relevance of the risk (e.g., Good & Abraham, 2007; Liberman & Chaiken, 1992), a phenomenon labeled by persuasion and health communication scholars as defensive processing.

Defensive processing occurs when people are motivated to arrive at a desired conclusion that is consistent with their existing valued beliefs or to reject an undesired conclusion that is inconsistent with their existing valued beliefs (Liberman & Chaiken, 1992). The motivation to reach a desired conclusion or to reject an undesired one can bias information processing by influencing which beliefs and rules are accessed in memory when evaluating the information (Kunda, 1987; 1990). When people are motivated to reach a particular conclusion, they will rely on only a subset of the relevant beliefs and inferential rules that are supportive of the desired conclusion, while ignoring beliefs and rules that are unsupportive. Because being reasonable is usually a valued belief people have about themselves, they will ensure that the justification they formulated for the desired conclusion is reasonable by their standards. For example, a heavy drinker may dismiss a message about the link between excessive drinking and increased risk of heart disease by convincing him- or herself that his or her heart disease risk is low because he or she exercises often and/or heart disease often happens for people who already have other health conditions.

Defensive Processing and Message Effectiveness

Defensive processing affects the effectiveness of health messages through influencing how a piece of information is comprehended and retained. Processing mediated messages involves three major sub-processes: (1) encoding, which reflects transforming information in a stimulus to a mental representation in working memory, (2) storage, which reflects linking newly encoded information to previously stored information in memory, and (3) retrieval, which reflects activating previously stored information through the associative network of memory (Lang, 2000, 2006). The three sub-processes are simultaneously active during media use, and the performances of them rely on a sufficient supply of cognitive resources (Lang, 2000, 2006). However, at any given time, people only have a limited supply of cognitive resources (e.g., Basil, 1994; Lang, 2000; Shiffrin & Schneider, 1977). These cognitive resources are allocated to the three processes as a function of a number of factors, such as the message structure, message content, and the individual's goals, among others. When more resources are allocated to one process, the resources available for other processes will be reduced and the performances of these processes will deteriorate.

In addition, people are "cognitive misers" who strive to use minimal cognitive effort to achieve maximal confidence on their conclusions from information processing (e.g., Chaiken, 1980; Chen, Duckworth, & Chaiken, 1999; Fiske & Taylor, 1991). Within the bounds of available cognitive resources, people exert cognitive efforts till they reach their desired confidence level, the point at which people feel their conclusions satisfy the

motives that drive that processing (Chen, Duckworth, & Chaiken, 1999). As a result of having limited cognitive resources and the tendency to be "cognitive misers," people encode information selectively. Bits of information that are relevant to one's goals and those that are novel or representing changes in the environment are more likely to be encoded than others (Lang, 2000).

Research has shown that motivationally relevant stimuli in the environment (e.g., rewards, punishments) can activate two motivational systems, the appetitive (or approach) system, which is responsible for organizing responses to rewards or positive stimuli, and the aversive (or avoidance) system, which is responsible for organizing responses to punishments or negative stimuli (Bradley, 1994; Cacioppo & Gardner, 1999; Lang, 2000, 2006; Lang, Bradley, & Cuthbert, 1997). The appearance of positive stimuli (e.g., food) leads to activation of the appetitive system, whose goal is to facilitate information intake. The appearance of negative stimuli (e.g., disease) leads to activation of the aversive motivational system, whose goal is to protect the organism from danger (Lang, 2000, 2006; Bradley et al., 2001).

People are well aware that health messages typically contain health risk information that is associated with negativity, such as harm, loss, disease, and death. Recognizing that a message is about a health risk (e.g., cancer, diabetes) can elicit activation of the aversive motivational system (e.g., Lang, Chung, Lee, & Zhao, 2005). At low levels of aversive activation (e.g., a person notices the mentioning of a health risk in a message), cognitive resources are automatically allocated to encoding to identify the

potential threat (Lang, 2000, 2006). If the level of aversive activation increases as the threat is identified, resources will be shifted away from encoding to retrieval to help the individual figure out how to cope with the threat. In addition, some resources will be shifted to storage because people need to remember what the threat is and how to avoid or cope with it next time (Lang et al., 2000, 2006). As a result, encoding and storage of other bits of information in the message will deteriorate.

This means that if people perceive a health message as a threat to their valued existing beliefs rather than an opportunity for learning, they may not be able to take full advantage of the beneficial health information, because the activated aversive motivational system will shift their cognitive resources to encode threat-related information and then to retrieve previous knowledge to deal with the threat, rather than allocate sufficient resources to facilitate encoding of the beneficial health information. Even when these bits of beneficial information are encoded, they may not be properly stored because the cognitive resources are likely to be insufficient. In this case, people not only may be unable to recall the important bits of beneficial health information, but also may strengthen their existing beliefs, because repeated retrieval of information makes beliefs more salient in memory (Anderson, 1983).

In short, at the cognitive level, defensive processing of a health message starts when the person identifies negative stimuli in the message that run counter to his or her existing valued beliefs. These stimuli can trigger activation in the aversive motivational system, which causes cognitive resources to be spent on dealing with the threat rather

than on properly encoding and storing the bits of beneficial health information. As a result, the encoding and storage of the beneficial health information deteriorates.

It is important to note that defensive processing is not a uniform process, because people differ and the contexts in which information is processed differ. For example, people differ on the beliefs they value, on the extent to which a piece of new information is viewed as consistent with their valued beliefs, and on their motivations and abilities to process information. Therefore, defensive processing may take many different forms depending on the situation. For example, it may take the form of biased systematic processing, which is effortful but biased scrutiny of information that favor what is congruent with one's existing beliefs while derogating the validity of what is incongruent. It may also take the form of selective heuristic processing, which is selectively relying on heuristics that have judgmental implications supporting the desired conclusion while ignoring those that are unsupportive. Moreover, it can take the form of defensive inattention, which is actively avoiding or refusing engagement with information that signals threat to one's existing beliefs (Chen, Duckworth, & Chaiken, 1999; Good & Abraham, 2007).

Likewise, defensive processing may not produce uniform outcomes across different situations. A wide range of factors, such as message features (e.g., argument quality, use of graphic image), audience characteristics (e.g., availability of cognitive resources, background knowledge), and contextual factors (e.g., time constraint, distractions) can influence the type of defensive responses produced by defensive

processing. Previous research has found a variety of cognitive and affective responses that are likely outcomes of defensive processing. For example, in a meta-analysis, Good and Abraham (2007) identified 12 categories of defensiveness measures that researchers have used to capture various manifestations of defensiveness to threatening messages, including message acceptance, defensive avoidance, perceived severity, perceived susceptibility, perceived threat, perceived prevalence, hopelessness and fatalism, religiosity, perceived manipulation, dissonance-reducing attitude change, egocentric contrast effects in social judgements, and prospective judgements of risk status and perceived risk.

The outcome measures in previous research can largely be categorized into three broad groups: (1) direct and proximate outcomes of defensive processing, such as affective responses measured right after message exposure and indicators of defensive avoidance, (2) distal outcomes of defensive processing indicated by one's acceptance or perceived effectiveness of the message, such as perceived convincingness and relevance of the message, and (3) distal and indirect outcomes of defensive processing reflected by one's perceptions and beliefs about the recommended behavior, such as attitude and intention, and the actual behavior change. In this research, I will follow this categorization and examine defensive processing as measured by indicators of defensiveness, indicators of message acceptance, and attitude and intention to perform the recommended behavior.

Why Does Defensive Processing Happen? – The Maintenance of Self

There are two major theoretical perspectives on why defensive processing happens: maintaining self-consistency (e.g., E. Aronson, 1968, 1992; Cooper & Fazio, 1984; Duval & Wicklund, 1972; Greenwald & Ronis, 1978; Swann, 1983, 1990) and maintaining self-integrity (e.g., Greenberg, Solomon, & Pyszczynski, 1989; Steele, 1988; Tesser, 1988, 2000). These two perspectives are grounded on the same basic assumption: the existence of a valued self that people strive to sustain in the face of threats. Before diving into details about the two perspectives, I will review relevant literature on *the self*.

What is the Self?

The self in this dissertation refers to "the representation or the set of representations about oneself, parallel to the representations people have of other individuals" (Swann & Bosson, 2010, p. 591). The self is not a unitary, monolithic entity. Rather, it is a vast, multifaceted, dynamic collection of pieces of information: beliefs, conceptions, evaluations, perceptions, theories, prototypes, goals, thoughts, etc. that people have about themselves (e.g., Baumeister, 1998; Greenwald & Pratkanis, 1984, Markus & Kunda, 1986; Schlenker 1980). These pieces of information, referred to as *self-knowledge* (Baumeister, 1998), are generated through summarizing information about oneself from one's interactions with his or her environment (Higgins, 1996). They capture one's relations to the world and the consequences of these relations for the purpose of improving person-environment fit in the service of survival (Higgins, 1996).

Properties of Self-knowledge

Individual pieces of self-knowledge vary on a number of dimensions: their importance/centrality, breadth/abstractness, explicitness, stability, clarity, among others. Of particular interest to this dissertation are the importance/centrality and breadth/abstractness dimensions of self-knowledge and their implications for the self. The variation on the importance of self-knowledge is straightforward. Some self-conceptions are more significant or valuable for the individual than others. For example, for a taxi driver in Minneapolis, "I can remember all the streets in Minneapolis" may be a more important self-conception than "I can recite the first 100 digits of Pi." But for someone who takes pride in his or her good memory for numbers, "I can recite the first 100 digits of Pi" may be a more important self-conception than "I can remember all the streets in Minneapolis." Importantly, people are more likely to behave in accordance with their highly important self-conceptions (Pelham, 1991) and they experience a stronger sense of threat when an important self-conception is challenged, and consequently are more apt to defend it (Markus, 1977; Swann & Bosson, 2010). For example, to James, having his self-conception of being a psychologist challenged was more frightening than attacks on his knowledge of Greek. As he put it, "I, who for the time have staked my all on being a psychologist, am mortified if others know much more psychology than I. But I am contented to wallow in the grossest ignorance of Greek. My deficiencies there give me no sense of personal humiliation at all" (1890/1950, p. 310).

Self-knowledge also varies in their breadth, that is, the amount of information self-knowledge conveys (Hampson, John, & Goldberg, 1987). The structure of self-knowledge in memory can be seen as hierarchical, with broader self-conceptions positioned towards the top, and more specific self-conceptions nested underneath within domains (e.g., Marsh & Hattie, 1996; Swann & Bosson, 2010). At the broadest level of the self-knowledge hierarchy are global self-conceptions, such as self-esteem, which are generalized beliefs reflecting a range of personal qualities (e.g., "I am worthwhile"). At the narrowest level are specific self-conceptions pertaining to specific qualities one has (e.g., "I cannot run a marathon on a rainy day"). Between these extremes are mid-level breadth self-conceptions that convey a moderate amount of information about the self (e.g., "I am honest"; Swann & Bosson, 2010). The breadth of the self-conception reflects the abstractness of the belief(s) that comprise the self-conception. The global self-conceptions such as self-esteem are the most abstract. They are context-free, reflecting knowledge about the self that is synthesized from a wide range of person-environment interactions. The narrowest self-conceptions are contextualized, such that thinking about these self-conceptions brings to mind specific scenarios and episodes of one's life.

Moreover, at any given time, people are only aware of a small portion of the vast body of self-knowledge (Baumeister, 1998: Swann & Bosson, 2010). This small amount of self-knowledge that is in one's consciousness is termed *working self-concept* (Markus & Kunda, 1986), also referred to as the *spontaneous self-concept* (McGuire, McGuire, & Winton, 1979), *active self-knowledge* (Swann & Bosson, 2010), and *phenomenal self*

(Jones & Gerard, 1967). The working self-concept is highly responsive to context (e.g., the individual's motivational state and/or the cues in the environment), such that different contexts activate different representations of the self in memory (Baumeister, 2010; Swann & Bosson, 2010). For example, health related self-knowledge (e.g., "I am relatively healthy," "I usually eat a balanced diet") may become highly accessible when a person reads a health message, while work performance related self-knowledge may be brought to mind when a person is being called to his or her boss' office. Importantly, it is assumed that the broad, abstract self-conceptions, such as self-esteem, are chronically accessible and are relatively unresponsive to changes in one's environment because of their importance in defining the self and wide applicability in various life situations (Higgins, King, & Mavin, 1982; Markus & Wurf, 1987).

Two implications can be drawn. First, people's view of the self at any given time may be confined by the context. Since a given context makes certain self-conceptions (but not others) accessible in memory, if no changes are introduced to the current environment, people will see themselves from an angle that is restricted by the portion of self-knowledge activated by their motivational state and the cues in the environment. For example, reading a health message suggesting that one's current behavior is putting his or her health at risk in the long-term, the person's attention may be fixated on the aspects of the self that are being addressed or threatened in the message (e.g., "I am relatively healthy," "I know what's good for me," "I make wise decisions," "I have control over important outcomes in life"), while being unaware of the vast body of other aspects of the

self that are equally or more important to them, such as their roles as good parents and/or helpful friends. Second, people's conceptions of themselves can be (temporarily) manipulated by changing the contexts they are in, or by instructing them to think in certain ways. This temporary change in self-view can have an impact on their subsequent behaviors. For example, Fazio, Effrein, and Falendar (1981) found that asking people to respond to questions that were biased towards extroverted (or introverted) tendencies led them to view themselves as relatively extroverted (or introverted) and later behaved in ways consistent with the induced self-views. Therefore, in the health message processing example above, if we can strategically change the environment that people are in and bring out certain self-knowledge, we may change the course of how a health message will be processed.

Another point worth stressing is that the pursuit of self-knowledge is selective. Previous research converged on three major motives that influence people's quest for self-knowledge, reflecting three types of preferences people have about the information regarding themselves (for a general review, see Sedikides, 1993): the motive to know oneself objectively and accurately (i.e., self-assessment) – a preference for information that can provide a clear and accurate picture of the self (for reviews, see Trope, 1983, 1986); the desire to enhance the positivity of self-conceptions or protect the self from negative information (i.e., self-enhancement) – a preference for information that has favorable implications for the self and avoid information that has unfavorable implications for the self (for reviews, see Alicke & Sedikides, 2009; Sedikides & Gregg,

2008); and the motive to confirm preexisting conceptions about the self (i.e., self-verification) – a preference for information that is consistent with what one already believes about him or herself (for reviews, see Swann, 1983, 1990). Importantly, although it seems that learning the truth about oneself would bring more adaptive benefits than confirming what one already knows about the self or avoiding unpleasant news about oneself all together, Sedikides' empirical tests (1993) showed that, in general, the self-enhancement motive is the strongest, followed by the self-verification motive, with the self-assessment motive being the weakest.

Recognizing people's general appetite for positivity and consistency over accuracy is critical for understanding how people process health messages. Health messages typically deliver information that has unpleasant implications for the self. Given people's tendency to avoid unpleasant information about the self, health messages are inherently unwelcomed. Therefore, to motivate people to approach health risk information and adopt positive actions, an interventionist has at least two possible options: (1) change the message content so that the message will not induce unpleasant implications for the self (which can be hard to achieve given the negative connotations of the issues typically covered in the messages), or (2) deliver the message in a way that circumvents the self-enhancement and self-consistency motives and let the self-assessment motive drive information processing.

The Maintenance and Perpetuation of Self

It is generally accepted that any experience that suggests that people's important self-conceptions are wrong ensues a sense of anxiety, and such anxiety motivates people to eliminate the threat. By doing so, people sustain their important self-conceptions and thereby sustain the self. Broadly, the phenomenon of defensive processing can thus be understood as resulting from the self exercising danger control: protecting itself from information that will cause a downward revision of one or more important self-conceptions. Two major lines of research exist regarding how cognitions about the self influence the processing of unwelcome information. One line of research suggests that cognitions about the self serve as standards or expectancies; defensive processing results from people trying to maintain consistency (e.g., Aronson, 1968, 1992; Duval & Wicklund, 1972). Another line of research suggests that cognitions about the self contribute to one's global sense of being capable and adequate; defensive processing results from people trying to maintain this global sense of adequacy (e.g., Steele, 1988; Tesser, 1988). These two lines of research bear many similarities but diverge on how defensive processing can be reduced.

The Maintenance of Self-consistency

The self-consistency reformulation of cognitive dissonance theory (Aronson, 1968, 1992) suggests that situations that evoke the experience of anxiety (i.e., dissonance) do so because they create inconsistencies between an important self-conception and the current behavior or cognition. Most people hold standards for their

behaviors that are based on conventional morals and prevailing values of society (Thibodeau & Aronson, 1992, p. 592). Positive self-conceptions reflect that the person upholds such standards. When a person performs a behavior or receives feedback that is at odds with these standards, dissonance is aroused, which in turn motivates the person to reduce this inconsistency and maintain positive self-conceptions by engaging in justification of the behavior or feedback (Thibodeau & Aronson, 1992). For example, a regrettable purchase of a music album does not go along very well with one being an effective decision-maker, and justifying this purchase (e.g., giving the product a more favorable rating) would allow one to restore the consistency (It is worth noting that if one does not hold high standards for competency and morality, the person will not perceive his or her incompetent or immoral behaviors as at odds with his or her self-conceptions, and thus will not experience dissonance).

The Maintenance of Self-integrity

Self-affirmation theory (Steele, 1988), however, suggests that people act defensively not just because their current behaviors or cognitions threaten their important self-conceptions, but also because the threat to their important self-conceptions challenges their sense of self-integrity, that is, their sense of being a moral and adaptively capable person. Therefore, in the case of cognitive dissonance, or in any other defensive processing situations, it is not the inconsistency per se that is threatening, rather, it is the implication of the inconsistency for the self that is threatening: the inconsistency between one's current behavior and one or more important self-conceptions implies the self is no

longer adequate and survival may be in jeopardy (Greenberg, Solomon, & Pyszczynski, 1989). Justification, or other forms of dissonance-reducing attitude or behavior change, reduces this inconsistency, and hence attenuates the discomforting implications for the self. From the perspective of self-affirmation theory, restoring consistency between one's behavior and the related self-conception is the means, not the end.

Although both perspectives suggest that defensiveness results from the discrepancy between one's cherished self-conceptions and one's behavior, they diverge in terms of the goal of defensive processing. The consistency view of dissonance theory holds that the goal of defensive processing is to restore the consistency between one's behaviors and the specific self-conception. Therefore, in the context of health message processing, the only way to reduce defensive responses to health messages would be to avoid invoking perceptions of discrepancy, which means the message content need to be revised to tune down the threat to one's self-conceptions. However, this can be hard to achieve given the negative connotations of the issues typically covered in health messages. In contrast, self-affirmation theory holds that the goal of defensive processing is to restore the sense of the self as being moral and adequate, rather than to restore the consistency between one's behavior and the related self-conception. Therefore, in the context of health message processing, self-affirmation theory has the benefit of allowing alternative ways to reduce defensiveness other than changing the message content. In the following sections, I will unpack the tenets of self-affirmation theory and discuss why

and how self-affirmation theory brings a potential solution to defensive processing of health messages.

Self-affirmation Theory – A Solution to Defensive Processing?

Tenets of Self-affirmation Theory

Self-affirmation theory emerged in social psychology as an alternative explanation of the cognitive dissonance phenomenon. The central tenet of self-affirmation theory is that people are fundamentally motivated to maintain a global sense of self-integrity – to perceive oneself as "adaptively and morally adequate, that is, as competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes, and so on (Steele, 1988, p. 262)." Whenever a threat to self-integrity is detected, be it a petty insult, losing one's job, or being diagnosed with cancer, a motivation to reaffirm the self will be activated which propels the individual to use whatever means is available to uphold the perception of global self-integrity.

Fluidity of the Multifaceted Self

It is important to note that the goal of this self-protective motivation is to maintain a global sense of self-integrity and not necessarily to resolve the specific self-threats – "it is the war, not the battle, that orients this system" (Steele, 1988, p. 289). Therefore, there are various venues through which people can restore a global sense of self-integrity. They can directly cope with the threat itself – by reducing or eliminating the threat, by denying the perception of the threat, or by downplaying the personal relevance of the threat. In

addition, however, people can engage in cognitive and/or behavioral activities that direct at affirming the perceived integrity of the self but circumvent the threat. Given that the self is dynamic and multifaceted (e.g., Baumeister, 1998; Greenwald & Pratkanis, 1984, Markus & Kunda, 1986; Schlenker, 1980), people derive their perception of self-integrity from many sources; any important knowledge of the self can contribute to the perception of self-integrity. People thus can affirm a global sense of self-integrity by engaging in thoughts and/or actions that demonstrate one's adequacy in one or more unthreatened areas of the self, as long as the affirmed alternative self-aspects support the perception of self-integrity as much as the threat threatens it (Aronson, Cohen, & Nail, 1999; Sherman & Cohen, 2006; Steele, 1988). For example, one does not need to deny the health risks of smoking if a global sense of self-integrity is secured by being a good parent or helpful friend.

Self-adequacy is Not Self-excellence

Another critical point worth noting is that the motivation to maintain the perception of self-integrity is not to see oneself as superior or excellent, but to see oneself as adequate, good enough (Cohen & Sherman, 2014; Steele, 1988). To affirm the sense of self-integrity, one only needs to establish a sense of adequacy in a cherished domain of the self, not a sense of excellence. In fact, bogus positive feedback that far exceeds the person's self-evaluation will not help secure the perception of self-integrity, because it lacks credibility.

Accessibility and Cost-effectiveness of Means

Steele (1988) suggests that what means will be used to affirm the self when a threat to the self is experienced is determined by availability, that is, to what degree a means of self-affirmation is accessible in the person's working memory. For example, recovering from a hurtful insult through reminding oneself that one is a wonderful friend seems more productive than resolving it through aggression, but if at the moment, the person is not aware that reflecting on one's quality of being a good friend can reduce the discomforting feeling invoked by the insult, this means will not be used.

Moreover, among equally available means of self-affirmation, which means will be used is determined by their relative cost-effectiveness. That is, if an available means is known to the person to be too costly or ineffective compared to other available means, it will not be used. For example, for a person who believes that being environmentally responsible is important to who he is, discovering that his new car is not as eco-friendly as he expected would threaten his sense of self-integrity. To restore the sense of self-integrity, he has a few options available: (1) reduce the importance he placed on being environmentally responsible, (2) sell the car and buy another one that is more eco-friendly, or (3) use the car less by riding a bike to work more. The first two options would be too costly. If he really cherishes environmental responsibility, it would be very hard to change this belief about himself. Also, selling the car and buying a new one may be too costly in terms of time, effort, and money. Therefore, even though all three options are

available, the person may choose the third option to restore a sense of self-integrity because it is most cost-effective.

Understanding Defensive Processing from the Perspective of Self-affirmation Theory

People in general want to think of themselves as adequately healthy because being healthy is a necessary condition to maintain the sense of adaptive adequacy, while illness and the prospect of death are some of the most powerful threats to this adequacy (Greenberg, Solomon, & Pyszczynski, 1997). Confrontation with health messages that suggest that one engages in unwise behaviors that would eventually impair one's health challenges one's idea of being relatively healthy and capable of controlling important outcomes in life. This perception that one's self-integrity is in jeopardy induces a discomforting psychological experience that the individual feels he or she must reduce. In an urgent need to alleviate this discomfort and restore the sense of self-integrity, the individual will use whatever means is available and cost-effective to reduce the threat (Steele, 1988). Often enough, the most accessible and effective means is to engage in defensive processing of the information to arrive at a desired conclusion consistent with existing beliefs about the self, by, for example, biasing the selection of cognitions and criteria used for information evaluation (Kunda, 1990). In this way, the self-threat is resolved and the sense of self-integrity is restored. However, the opportunity to benefit from the health risk information and the behavior recommendations is lost.

Alternative Means to Self-affirm without Resolving Self-threats

Theoretically, any cognitive activity or behavior that demonstrates one's adequacy and as a result secures one's overall sense of self-integrity is a means of self-affirmation (Cohen & Sherman, 2014; Steele, 1988). In daily life, a means of self-affirmation can be a big achievement like winning an Olympics medal, getting a promotion, or finishing a semester with straight "A"s; it can also be small joyful actions like volunteering at a local bike repair co-op, visiting a good friend, or taking selfies. Toma and Hancock (2013) found that even Facebooking can be self-affirming. Subjects who spent time browsing their own Facebook profiles before receiving negative feedback were as receptive of the feedback as subjects who completed a standard self-affirmation task and were more receptive of the feedback than un-affirmed subjects. Though small, these activities can bring to mind satisfying moments in life that are important to the individual and in turn achieve an expansive view of the self and help people withstand self-threats.

Means of Self-affirmation in the Lab

Empirical self-affirmation research so far has focused on experimentally providing subjects relatively uniform means of self-affirmation. These means of self-affirmation are usually administered by researchers as independent procedures in lab experiments. Although differences in formats or procedures exist, most self-affirmation studies have people reflect on one or more cherished values or personal strengths that contribute to the overall sense of self-integrity (Cohen & Sherman, 2014; McQueen &

Klein, 2006). There are three formats of self-affirmation manipulations that are commonly used in self-affirmation research: essay, scale, and feedback.

In the essay format self-affirmation manipulations, participants are typically asked to rank a list of values or personal qualities (e.g., intelligent, honest, helpful) in terms of personal importance. The list typically excludes values relevant to the domain of threat in order to avoid confining people's attention on the threatened domain and to broaden people's focus on alternative domains of the self. For example, to buffer people against threatening health information, researchers may exclude health and rationality from the list. People then write a short essay about the importance of their top ranked values and how they have used them in their lives.

The scale format of self-affirmation involves completing a scale that resembles personality assessment. The scale items are worded in a way that emphasizes the positivity of a given value or personal quality. A frequently used scale format self-affirmation manipulation is the Allport-Vernon-Lindzey Values Scale (AVL; Allport, Vernon, & Lindzey, 1960) that includes six value domains: theoretical, economic, aesthetic, social, political, and religious. Self-affirmation studies using this scale typically ask participants to indicate which of the six values are important to them, and then use this information either to pre-select participants (e.g., Steele & Liu, 1983) or assign to them a subscale corresponding to their important values (e.g., Tesser & Cornell, 1991).

Because administrating the AVL scale involve multiple data collection stages and the language of the scale can be difficult for people with low literacy or education levels

to comprehend (McQueen & Klein, 2006: Napper, Harris, & Epton, 2009), studies have explored alternative scale format self-affirmation manipulations. For example, Napper et al. (2009) developed a scale format self-affirmation manipulation that features 32 value statements from the Values in Action Strengths scale (Peterson & Seligman, 2004). The value statements described values, characteristics, and personal strengths that people generally would found desirable (e.g., "My friends value my good judgment," "I must stand up for what I believe in, even in the face of strong opposition"). Napper and colleagues' validation study (2009) showed that this scale achieved comparable self-affirmation effects as the AVL scale and the essay format self-affirmation task.

The third category of self-affirmation manipulation involves giving subjects positive feedback of some sort on one or more domains of the self. For example, studies have done so by providing bogus positive results on personality tests (e.g., Steele, Spencer & Lynch, 1993) or valued skills (Ben-Ari, Florian, & Mikulincer, 1999).

Critically, a commonality of the different formats of self-affirmation manipulations is that they draw people's attention to the cherished positive domains of self that are unaffected by the threat. This enables the individual to view the threatening situations from a broader perspective and focus on what really matters to them (Cohen & Sherman, 2014).

Evidence of Self-affirmation Manipulations Reducing Defensive Processing

Evidence in Reducing Cognitive Dissonance

Early empirical applications of self-affirmation theory focused on testing whether self-affirmation manipulation can attenuate dissonance-reducing attitude change (i.e., attitude change aimed at reducing dissonance caused by the discrepancy between one's behavior and an important self-conception) after a cognitive dissonance experience. These studies typically used a 2 (dissonance: high, low) x 2 (self-affirmation: yes, no) experimental design and adopted the conventional forced-compliance paradigm to induce cognitive dissonance (e.g., Steele & Liu, 1983; Steele, Spence, & Lynch, 1993) with the dissonance-reducing attitude change as the outcome variable. For example, in two of Steele and Liu's (1983) studies, dissonance was induced by having subjects write counter-attitudinal essays supporting a large tuition rise at their university under conditions of high choice (i.e., subjects were aware that they were not coerced to write the essays); self-affirmation was administered by having subjects fill out a value scale; and dissonance reduction was measured as the amount subjects changed their post-essay attitudes to match their essay position. Steele and Liu found that those who wrote a counter-attitudinal essay experienced increased cognitive dissonance and changed their attitude to match their essay's position, but completing the value scales immediately after essay writing eliminated this dissonance-reducing attitude change among subjects for whom the value was self-relevant.

The success of self-affirmation manipulations in attenuating dissonance-reducing attitude change provided support for evidence to the proposition that people's motive to maintain self-integrity (i.e., self-affirmation motive) triggers the experience of cognitive dissonance and drives the dissonance-reducing attitude change and behaviors. These findings propelled researchers to apply self-affirmation manipulations in other contexts where encountering with uncongenial information might trigger self-defensive means to cope with the threat, such as in close relationships, education, and health communication.

Evidence in Reducing Defensiveness to Health Messages

Can self-affirmation reduce defensive processing of health messages? Overall, there is good evidence that self-affirmation manipulations can increase people's openness to information about the potential risks of health-compromising behaviors and reduce message derogation. For example, Sherman, Nelson, and Steele (2000) found that compared with unaffirmed participants, self-affirmed female coffee drinkers were more accepting of a message that linked caffeine consumption to breast cancer and reported greater intentions to reduce coffee consumption (see also Reed & Aspinwall, 1998). Jessop, Simmonds, and Sparks (2009) found that self-affirmation led to less defensive processing of a message about the health risks of sunbathing among white female sunbathers. In addition, research has shown that self-affirmation manipulations can reduce defensiveness toward messages promoting disease detection behaviors. For example, van Koningsbruggen and Das (2009) found that for participants at risk for type-2 diabetes, completing a self-affirmation task decreased derogation of a message

encouraging online diabetes risk testing, improved participants' intentions to do an online diabetes risk test, and increased online diabetes risk test taking behavior as well.

Self-affirmation effects even extend to deeply ingrained and hard to change behaviors such as smoking. Harris et al. (2007) found that compared to unaffirmed smokers, self-affirmed smokers rated four cigarette graphic warning labels as more threatening and personally relevant and reported higher levels of control, self-efficacy, and intentions to quit smoking. Armitage et al. (2008) found that among smokers low in socioeconomic status, self-affirmed participants showed higher message acceptance and intention to quit than unaffirmed participants. Also, significantly more self-affirmed participants took leaflets about how to quit smoking than unaffirmed participants.

Besides reducing message derogation (and increasing message acceptance), there is also evidence that self-affirmation can influence other common indicators of defensive processing, such as downplaying the personal relevance and severity of health risks. For example, self-affirmed females rated their sexual experience as significantly more similar to those in an AIDS educational video than did unaffirmed females (Sherman et al., 2000); self-affirmed smokers reported cigarette graphic warning labels to be more personally relevant (Harris, Mayle, Mabbott & Napper, 2007) than did their unaffirmed counterparts; and self-affirmed heavy drinking female students rated a message linking breast cancer and alcohol as just as relevant to them as to the average student, whereas their unaffimed counterparts rated it as more relevant to the average student (Napper, Harris, & Epton, 2009).

Some studies have also shown that self-affirmation resulted in increased self-risk perceptions. For example, self-affirmed female participants showed reported higher perceived risk for HIV after viewing an AIDS educational video (Sherman et al., 2000) and self-affirmed female heavy drinkers showed higher personal risk ratings for breast cancer (Harris & Napper, 2005) than their unaffirmed counterparts.

However, not all self-affirmation studies in the health context reported supporting evidence. Some studies did not find positive effect of self-affirmation on reducing message derogation (e.g., Dillard, McCaul, & Magnan. 2005; Fry & Prentice-Dunn 2005; Harris & Napper, 2005; Zhao & Nan, 2010; Zhao et al. 2012) or increasing perceived personal risk (e.g., Harris et al., 2007). Also, recent meta-analyses (Epton et al., 2015; Sweeney & Moyer, 2014) revealed that across a range of health behaviors, the positive effect of self-affirmation on message acceptance is small (d = .17, CI [.03 to .31]), as are its effects on behavioral intentions (d = .14, CI [.05 to .23]) and on the uptake of actual behavioral recommendations (d = .32, CI [.19 to .44]).

The mixed findings and small effect sizes suggest that more research is needed on the immediate outcomes of self-affirmation to determine the underlying mechanisms of self-affirmation effects and more research is needed on the potential moderators of self-affirmation effects to uncover the boundary conditions. In the following sections, I will discuss research exploring these two unanswered questions. Particularly, I will outline one possible pathway through which self-affirmation may achieve its effect in reducing defensive responses towards health messages and described an individual difference

moderator that have acquired much attention and one that awaits more research. The purpose for these discussions is to set the foundations for later sections on the role of self-esteem in self-affirmation effect.

Unanswered Questions – Mechanisms and Boundaries of Self-affirmation

Underlying Mechanism

How do self-affirmation manipulations make people less defensive and more receptive of threatening information about health? What happens after people are self-affirmed? To date, extant research has not agreed upon what the underlying mechanisms are, and there exists very little empirical evidence documenting how self-affirmation affects health message processing.

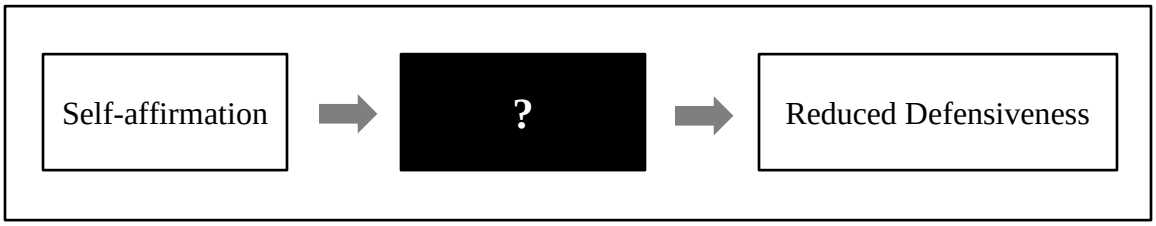


Figure 1.1 Potential mechanism underlying self-affirmation effects

Conceptually, self-affirmation manipulation reduces defensiveness by alleviating the discomforting implication of threat to the self and hence reduces the motivation to affirm the sense of self-integrity, thus allowing the individual to dispassionately evaluate persuasive communication (Steele, 1988). Correll, Spencer, and Zanna (2004) proposed

that if self-affirmation works by removing the self-defensive bias and increasing objectivity in information processing, we should observe that when the message optic is self-important, self-affirmed individuals would be more sensitive to argument quality than unaffirmed individuals, recognizing the merits and the demerits in the message, and be more persuaded by messages with strong arguments than weak arguments, even when the message is pro-attitudinal. Their study confirmed this proposition. They found that compared with unaffirmed participants, self-affirmed participants were more critical of pro-attitudinal arguments though they were not significantly more likely to accept contradictory arguments (see also Cohen et al., 2000, Study 3; Reed & Aspinwall, 1998). Also, self-affirmed participants were more sensitive than unaffirmed participants to argument strength for both pro-attitudinal and counter-attitudinal messages, in that only self-affirmed participants rated strong arguments as more persuasive than weak arguments.

Demonstrating that self-affirmation manipulation increases objectivity in information processing is one step closer to uncovering how self-affirmation reduces defensiveness to uncongenial information. However, this still only explains a distal stage of the cascade of effects that self-affirmation produces. How does self-affirmation increase objectivity in information processing? What happens immediately after self-affirmation?

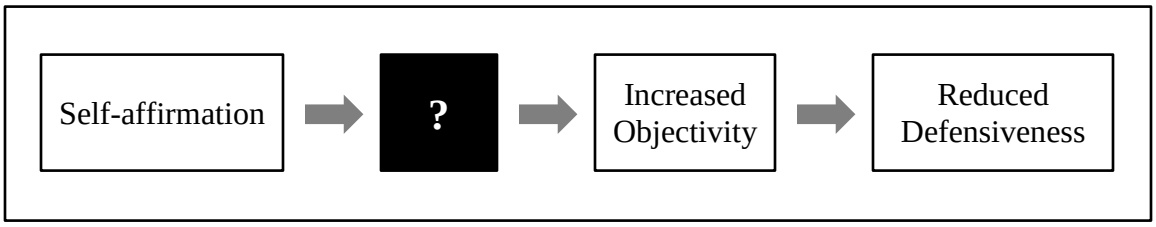


Figure 1.2 Potential mechanism underlying self-affirmation effects

A line of research that draws on construal level theory (Trope & Liberman, 2003) suggests that self-affirmation manipulations lead people to process information using abstract or higher levels of mental construals. This information processing style enables people to evaluate a situation from a broader perspective that emphasizes the defining features rather than the secondary details (Wakslak & Trope, 2009). It also enables people to excise higher levels of self-control where behaviors are reflective of long-terms goals rather than impulsive responses to the situation (Schmeichel & Voh, 2009).

Self-affirmation manipulations typically ask people to think about important values. These values reflect the most central and abstract features of the self. When people reflect on core personal values in a self-affirmation task, they tend to view themselves from a "big picture" perspective, which enables them to see the primary, defining characteristics of themselves. Relating to construal level theory, this "big picture" perspective reflects the use of high-level construals, and the activation of this high-level construal mindset will influence the processing of subsequent evaluative targets. For example, Wakslak and Trope (2009) found that compared to unaffirmed individuals, self-affirmed individuals perceived themselves in a more coherent, structured

manner, increasingly identified tasks in terms of their ends versus their means, more strongly based product evaluations on primary over secondary features, and performed better on a task requiring them to structure fragmented visual input than one requiring detail-oriented thinking. Consistent with Waslak and Trope's findings, Schmeichel and Vohs (2009) found that self-affirmation led individuals to prefer more abstract descriptions of events, and affirming the self at a high level of mental construal led to greater self-control while affirming the self at a low level of mental construal did not. Moreover, Sherman and colleagues (2013) found that self-affirmation tasks broadened Latino American students' construals so that they saw events at a more abstract rather than concrete level, which prevented daily adversities being interpreted as identity threats and hence insulated academic motivations from being undermined by identity threat.

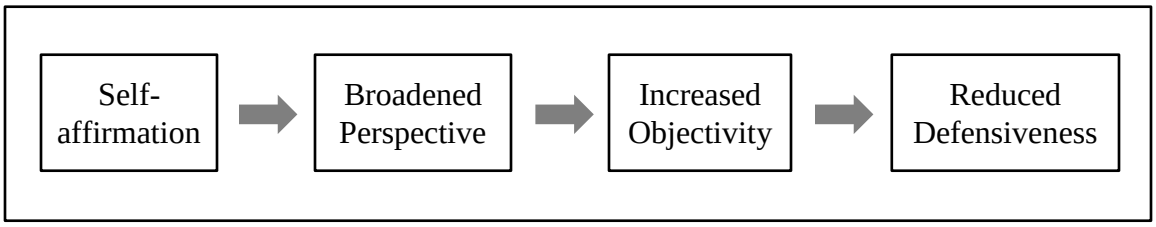


Figure 1.3 Potential mechanism underlying self-affirmation effects

In conclusion, self-affirmation can lead people to take a "big picture" perspective when evaluating subsequent events, including when the situation is self-threatening. Therefore, when self-affirmed, a threatening health message loses its self-threatening capacity because the individual now views both the self and the threatening information

from a broader perspective, and the individual can thus evaluate the message by its merits instead because self-integrity is no longer at stake (Sherman & Hartson, 2011). This view is consistent with Critcher and Dunning (2015)'s proposition that self-affirmation expands the working self-concept, offers a broader view of self-worth, and thereby weakens the evaluative impact of the threat on the self. Critcher and Dunning (2015) found that for self-affirmed participants, the threatened self-aspect was less defining of the self (although still just as important) compared with unaffirmed participants, and the broadened perspective on the self mediated the self-affirmation effects on defensiveness.

Boundaries

Individual Risk Level

Another area that awaits more research is the boundary conditions of self-affirmation effects. Whilst a mounting body of evidence attests to the success of self-affirmation in reducing defensive processing and producing positive changes in behavioral outcomes, it is noteworthy that the reported effects are not always consistent. This suggests the possibility of moderating factors. To date, few potential moderators of self-affirmation effects have received systematic empirical scrutiny (Cohen & Sherman, 2014). Like many other social psychological interventions, self-affirmation manipulations may influence certain types of people more than others. However, in the health domain, studies examining individual difference moderators of self-affirmation effects are few and far between (Harris & Epton, 2010). The only exception is the moderating role of individual risk level. It has been found that positive self-affirmation effects are usually

the most pronounced among individuals who are at moderate to high risk, while for individuals at low risk, self-affirmation exhibited no benefits (e.g., Armitage et al., 2008; Harris & Napper, 2005; Klein & Harris, 2009; van Koningsbruggen & Das, 2009). For example, Harris and Napper (2005) found that self-affirmed high risk participants (i.e., heavy drinkers) showed greater acceptance of the personal implications of message than did their unaffirmed counterparts; they reported higher personal risk ratings for breast cancer from their alcohol consumption, greater ease of imagining themselves developing the disease, and greater intention to reduce their current level of alcohol consumption. Similarly, van Koningsbruggen and Das (2009) found that self-affirmation decreased message derogation, increased intentions to do an online risk test, and promoted online risk test taking among participants at-risk for type 2 diabetes. In fact, among participants not at-risk, self-affirmation decreased intentions and online risk test taking.

It is encouraging that self-affirmation has been shown to produce the most pronounced effects among people at moderate to high levels of a health risk, because this population is the most in need of health interventions to protect them from the health risk but also is the most likely to respond defensively to health messages. At the same time, an important implication can be drawn for research on other moderators of self-affirmation effects. If positive self-affirmation effects are more likely to happen among people with moderate to high levels of risk than among those with low risk, having participants with moderate to high levels of risk may be a prerequisite for self-affirmation effects to be detected. Therefore, in self-affirmation research, when choosing a study

population or health risk topics to address, it may be necessary to ensure that the population selected faces at least moderate levels of health risk.

What about Self-esteem?

A dispositional factor that is critical to our understanding of the boundaries of self-affirmation effects in the health context is self-esteem – one's global evaluation or attitude relating to the self (Rosenberg, 1965). Research examining the relationships between self-esteem and health outcomes has shown that people with low self-esteem have a greater tendency to engage in health-compromising behaviors in the future (e.g., McGee & Williams, 2000; Stinson et al., 2008; Trzesniewski et al., 2006), but people with high self-esteem are more likely to use self-serving cognitive strategies to justify their current health-compromising behaviors (e.g., Gerrard, Gibbons, Reis-Bergan & Russell, 2000; Smith, Gerrard, & Gibbons, 1997).

Given self-esteem's important associations with health outcomes and its close conceptual relevance with self-affirmation – the former approximates one's self-adequacy and the latter reflects efforts to secure one's global sense of self-adequacy – it is critical to explore the interplay between self-affirmation and self-esteem to better understand *when* and *how* self-affirmation can reduce defensiveness and increase openness towards personally relevant uncongenial information. From an applied perspective, understanding whether self-affirmation influences people with varying strengths of self-esteem differently is especially important in determining the effectiveness of self-affirmation-based health interventions. It would be beneficial to

establish whether incorporating self-affirmation in health interventions may have positive effects for some, but weak or even adverse effects among others. This dissertation seeks to address this gap in the literature and contribute to health intervention design and planning by exploring the possible moderating role of self-esteem on the effectiveness of self-affirmation at reducing defensiveness to personally relevant health messages.

Self-esteem – A Determinant of Self-affirmation Effect

What is Self-esteem?

In this dissertation, self-esteem is defined as one's global evaluation or attitude relating to the self (Rosenberg, 1965). It is people's value judgement on the self based on self-knowledge (Baumeister, 1998). Also, here, self-esteem is viewed as a relatively stable trait rather than a fluctuating state. The assumption is that most people have a relatively stable self-esteem, because it reflects an evaluation of the self that is based on a vast body of diverse person-environment interactions. Unless one's interpretation or memory of a significant portion of these interactions is drastically changed or a significant amount of new interactions is added to the memory, self-esteem should remain relatively stable. People's self-evaluations in a given situation may vary to some degree because the self-knowledge that is available at the time point may differ, but they generally fluctuate around the self-esteem baseline (Baumeister, 1998).

Researchers have not agreed upon whether people's self-esteem is accessible at any given time. Some believe that self-esteem is chronically accessible because of its

importance in defining the self and its wide applicability in various life situations (e.g., Higgins, King, & Mavin, 1982; Markus & Wurf, 1987), while others believe that self-esteem needs to be activated in working memory through self-awareness which results from self-referencing (e.g., Baumeister, 1998; Steele, Spencer, & Lynch, 1993). These two views are not necessarily contradictory because most life situations contain self-relevant information which can trigger self-awareness and thus bring self-esteem online.

Self-esteem and Health Outcomes

Regardless of the popular belief in the general public that high self-esteem reflects optimal human functioning and is key for productivity, happiness, well-being, and academic achievement (Baumeister, 1998), previous research has associated high self-esteem with both positive (e.g., Robins, Hendin, & Trzesniewski, 2001; Shrauger & Rosenberg, 1970; Tennen & Affleck, 1993) and negative outcomes (e.g., Baumeister, Heatherton, & Tice, 1993; Baumeister, Smart, & Boden, 1996; Crocker, Thompson, McGraw, & Ingerman, 1987; Fitch, 1970). In the health domain specifically, on the one hand, high self-esteem has been found to safeguard people from fear and uncertainty, and result in greater resilience in the face of stress and physical diseases (e.g., Broers et al., 1998; Penninx et al., 1998). On the other hand, studies also found that people with high self-esteem are more likely to use self-serving cognitive strategies to discount their vulnerability to the health risks of their behaviors (e.g., Gerrard, Gibbons, Reis-Bergan & Russell, 2000; Smith, Gerrard, & Gibbons, 1997).

Regarding the outcomes of low self-esteem, the empirical literature is more uniform. Low self-esteem is considered as a risk factor for psychiatric vulnerability and health-comprising behaviors (Mann et al., 2004). For example, low self-esteem during childhood (Reinherz et al., 1993), adolescence (Teri, 1982) and early adulthood (Wilhelm et al., 1999) was found to be predictive of depression later in life. Also, compared with adolescents with high self-esteem, adolescents with low self-esteem had poorer mental and physical health and higher levels of criminal behavior during adulthood (Trzesniewski et al., 2006). McGee and Williams (2000) found that self-esteem in preadolescence significantly predicted linear trends in adolescent reports of problem eating, suicidal ideation, and multiple other health-compromising behaviors.

Role of Self-esteem in Self-affirmation Effects

The complex yet important relations between self-esteem and health outcomes suggest that self-esteem may be an influential individual difference factor worth attention in self-affirmation research on health message processing. Moreover, conceptually, self-esteem and self-affirmation are closely related. Self-esteem approximates one's self-adequacy while self-affirmation reflects efforts to secure the sense of self-adequacy when it is threatened. People with high and low levels of self-esteem may have very different ideas about to what extent the self is considered adequate. People with high self-esteem (HSE) may have a high expectation for themselves and may consider themselves capable and adequate in a wide range of life situations, while people with low self-esteem (LSE) may have a low expectation for themselves and may consider themselves capable and

adequate in a limited number of life situations. What people with LSE considered as adequate may not be adequate for people with HSE while what people with HSE considered as adequate may be too overwhelming for people with LSE. Therefore, when threatened, people with HSE and LSE may require different levels of self-affirmation to restore the sense of self-adequacy.

To date, self-esteem as a moderator of self-affirmation effects on health message processing has not been comprehensively studied. The few studies that examined self-esteem and self-affirmation produced inconsistent findings. Three competing propositions exist regarding whether and how self-affirmation affects health message processing for people with different strengths of self-esteem.

Self-esteem as Resource: Self-affirmation Enlarges Disparities

Steele, Spencer, and Lynch (1993) suggest that self-esteem is an indicator of people's chronic self-affirmational resources: favorable knowledge about the self that contributes to one's sense of self-integrity. People with HSE have a large reservoir of favorable knowledge about the self while people with LSE have a small reservoir of favorable knowledge about the self. Therefore, when self-knowledge is made accessible (e.g., reflecting on self-important values in a self-affirmation task), people with HSE will find it easy to recruit favorable self-knowledge to secure their sense of self-integrity and will be more resilient when facing a self-threat. In contrast, people with LSE will be aware of the scarcity of favorable self-knowledge when self-knowledge is made accessible. This discomforting experience will be amplified as they subsequently

confront a self-threat and thus lead to stronger defensiveness. This proposition has received some support in cognitive dissonance-related self-affirmation research. For example, Steele and colleagues (1993, study 2) found that participants with HSE who self-affirmed through completing the Rosenberg (1965) self-esteem scale did not rationalize after a dissonance manipulation while participants with LSE who completed the same self-affirmation task rationalized. In addition, Nail, Misak, and Davis (2004) found that in a role-playing task where participants imagined being stood up by a friend, those with LSE derogated the friend more than those with HSE, regardless of whether the friend had a sufficient justification or not.

If we apply this proposition to the health message processing context, we should expect that self-affirmed individuals with HSE show less defensiveness towards personally relevant health messages compared to their unaffirmed counterparts, because self-affirmation made them aware of their large reservoir of favorable self-knowledge that can be used to affirm a sense of self-integrity. On the contrary, self-affirmed individuals with LSE will report more defensiveness towards the messages compared to their unaffirmed counterparts because self-affirmation reminded them of the scarcity of favorable self-knowledge and thus amplified the discomforting implications of the message on the self. However, Steele et al., (1993)'s finding that self-affirmation reduced dissonance reduction attempts among people with HSE but increased dissonance reduction attempts among people with LSE has yet to be replicated in the health message processing context. So far, the only study that tested the role of self-esteem in self-

affirmation effects on health message processing found the opposite: self-affirmation reduced message derogation among people with LSE but showed no effect among people with HSE (Düring & Jessop, 2014). I will discuss this in the following section.

Self-esteem as Resource: Self-affirmation Reduces Disparities

Though also based on the assumption that self-esteem reflects one's chronic self-affirmational resources, some scholars suggested the opposite regarding the role of self-esteem in self-affirmation effects. They argue that individuals with LSE will benefit from self-affirmation in the face of self-threat while people with HSE will not (e.g., Düring & Jessop, 2014; Spencer, Fein, & Lomore, 2001; van Dijk et al., 2011). This view differs from Steele et al., (1993) in that it assumes that people with HSE have a reservoir of favorable self-knowledge that is not only larger but also more readily accessible when the need to secure self-integrity arises, compared to people with LSE. This reasoning is based on research showing that when faced with threatening information, people with HSE are more likely to recruit thoughts about their strengths while suppressing thoughts about their weaknesses (e.g., Dodgson & Wood, 1998). Therefore, when the self is threatened, for people with HSE, self-affirmation manipulation may not bring them extra benefits because they can automatically fall back on their strengths. In contrast, people with LSE may require an external intervention like self-affirmation manipulation to make them aware of the favorable self-knowledge to repair their sense of self-integrity.

This view has been supported in several studies. For example, Spencer, Fein, and Lomore (2001) found that self-affirmation reduced the defensiveness towards threatening

information about test performance among people with LSE but showed no effect among those with HSE. Van Dijk et al. (2011) found that among unaffirmed participants, participants with LSE experienced a stronger self-threat when confronted with a high-achiever and increased their schadenfreude, compared to participants with HSE. However, this response was attenuated when people with LSE were given an opportunity to self-affirm. In the context of health message processing, Düring and Jessop (2014) found that completing a self-affirmation task before reading a health message promoting exercising evened out the disparities between people with HSE and LSE on message derogation, attitude and intention toward increasing exercising: self-affirmed people with LSE showed reduced message derogation and increased attitude and intention toward increasing exercise compared to their unaffirmed counterparts; but among people with HSE, there was no difference between those who were self-affirmed and those who were unaffirmed.

Self-esteem as Expectancy: Self-affirmation Highlights Discrepancies

A third proposition on the role of self-esteem in self-affirmation effect stems from the self-consistency explanation of cognitive dissonance (Aronson, 1968; 1992). Aronson's reformulation posits that the dissonance process is mediated by the self: dissonance results not just from two inconsistent cognitions but results from the cognition's inconsistency with one's self-concept. For example, recall that a regrettable purchase of a music album does not go along very well with one being an effective decision-maker, and thus rationalizing this purchase would allow one to restore the

positive self-image. Although the self-consistency view of dissonance and self-affirmation theory seems identical at first glance, they propose competing predictions regarding the role of self-esteem in the dissonance reduction process. According to the consistency view, a dissonance-inducing act should cause more self-consistency-restoring rationalization among people with HSE than among people with LSE. This is because the dissonant act seems more inconsistent with a highly positive self-evaluation (e.g., HSE) versus a less positive one (e.g., LSE). The large discrepancy between the act and the self-evaluation will motivate people with HSE to engage in dissonance reduction (e.g., defensive processing) to a greater extent than people with LSE (Thibodeau & Aronson, 1992).

In the health intervention context, Gibbons, Eggleston, and Benthin (1997) found that during participation in a smoking cessation program, the decline in risk perceptions among relapsers was associated with self-esteem; relapsers with HSE experienced greater decline in commitment to quitting than did relapsers with LSE. In addition, Boney-McCoy, Gibbons, and Gerrard (1999) found that despite that participants with HSE and LSE showed no difference on the levels of risky behaviors, those with HSE who were made aware of their risky sexual behaviors reported lower perceived risks of STDs than their counterparts with LSE. Also, participants with HSE who reported risky behaviors reported more favorable personality ratings subsequently than participants in any other conditions. These findings suggest that compared to people with LSE, people with HSE may perceive greater discrepancies when they are made aware that their current health-

related behaviors fell short of their positive self-evaluations. The discomforting inconsistencies will motivate them to engage in greater attempts to reduce the discrepancies to maintain their positive self-evaluations.

Self-affirmation manipulation, a procedure during which one's attention is directed to the self, can activate a processing style that tends to encode information in terms of its relevance for the self and thus result in increased sensitivity and responsivity to self-relevant aspects of the environment (Hull & Levy, 1979; Hull et al., 2002). This means that self-affirmed individuals will attend to self-relevant information in a health message more readily than unaffirmed individuals and will be more sensitive to self-threats (van Koningsbruggen, Das, & Roskos-Ewoldsen, 2009). For people with HSE, this also means the discrepancy between their boosted senses of self-worth and the self-threat is made more salient and thus may result in even greater defensiveness.

Summary

In short, three competing propositions exist regarding whether and how self-affirmation affects health message processing for people with different strengths of self-esteem (See *Table 1.1*). The *self-esteem as resource* proposition (Steele, Spencer, & Lynch, 1993) suggests that people with HSE have a larger reservoir of chronical self-affirmational resources (i.e., favorable self-knowledge that contributes to self-integrity) than people with LSE. When these resources are made accessible in working memory through, for example, self-affirmation manipulations, people with HSE will be more resilient in the face of self-threatening information from a health message and exhibit

lower defensiveness. However, for people with LSE, self-affirmation manipulation reminds them of their lack of favorable self-knowledge and therefore may increase their perception of self-threat and defensiveness when facing self-threatening information from a health message.

A second possibility is that people with HSE have readily access to the larger reservoir of self-affirmational resources and automatically draw on these resources when facing self-threatening information, while people with LSE are less likely to do so. When people face self-threatening information from a health message, self-affirmation manipulations can make people with LSE aware of their favorable self-knowledge and hence aid them in repairing the sense of self-integrity. For people with HSE, self-affirmation manipulations do not bring extra benefits because people with HSE can automatically draw on favorable self-knowledge to repair their sense of self-integrity. In this case, self-affirmation manipulation reduces the disparities on health message acceptance between people with HSE and LSE.

The third possibility stems from the self-consistency proposition (Aronson, 1968; 1992) and takes into account of the by-product of self-affirmation manipulation, i.e., self-directed attention. For people with HSE, self-directed attention may make salient the large discrepancy between their positive self-evaluations and the negative feedback in the health message and hence lead to greater defensiveness, compare with their unaffirmed counterparts. However, for people with LSE, the discrepancies made salient between

their self-evaluations and the negative feedback in the health message are much smaller and more acceptable and therefore less likely to induce defensiveness.

In the following sections, I will first explore whether the proposition that self-affirmation functions as resources and that self-affirmation enlarges the disparities between people with HSE and LSE would apply to the health message processing context. Next, I will explore circumstances in the health message processing context under which each of the three propositions may apply and explain when self-affirmation may reduce defensive processing of health messages among people with HSE and LSE.

Table 1.1 Theoretical Perspectives on the Role of Self-esteem

Self-esteem as Resource		
Proposition 1	Self-affirmation **enlarges disparities**	**HSE**: abundant positive self-concepts → less defensive
		LSE: lack of positive self-concepts → more defensive
Proposition 2	Self-affirmation **reduces disparities**	**HSE**: positive self-concepts constantly accessible → no change
		LSE: brings positive self-concepts to mind → less defensive
Self-esteem as Expectancy		
Proposition 3	Self-affirmation **highlights discrepancies**	**HSE**: larger discrepancies between unwelcome info & self-evaluation → more defensive
		LSE: smaller discrepancies between unwelcome info & self-evaluation → no change

Domain of Self-threat

It is worth noting that, to date, the proposition that self-esteem functions as resources and that self-affirmation can enlarge disparities between people with HSE and LSE in responses to dissonance experiences (Steele, Spencer, & Lynch, 1993) has not been demonstrated in the health communication context. Studies that reported supporting evidence are in the free-choice paradigm of cognitive dissonance research (Brehm, 1956). These studies induce self-threat through a dissonance manipulation that typically asks participants to make a difficult choice between two equally valued options (e.g., two equally ranked music albums); the phenomenon that people subsequently value the chosen alternative more strongly than they initially had, and the unchosen one less so, is dissonance reduction, a cognitive strategy people use to relieve the self from the psychological discomfort caused by losing the equally desirable unchosen option. Essentially, this manipulation induces dissonance by inducing a threat to one's sense of autonomy, manifested through reducing one's freedom of behavioral choices (Brehm & Brehm, 1981). In the health communication context, a parallel of this autonomy threat manipulation is the use of controlling language in health messages (e.g., "you must floss twice a day," "you have to quit smoking"). Studies have shown that health messages with controlling language induce higher levels of perceived threat to autonomy than health messages with polite language (e.g., Dillard & Shen, 2005; Miller et al., 2007; Quick & Stephenson, 2007). Thus, to determine whether the proposition that self-esteem functions as resources and that self-affirmation can enlarge disparities between people with HSE

and LSE applies in the health communication context as in the autonomy threat caused dissonance context, we can first test whether it can be demonstrated in a health communication context where an autonomy threat is induced through the use of controlling language.

If this proposition applies in a health communication context where an autonomy threat is featured, we should expect that after reading a personally relevant health message with controlling language, self-affirmed individuals with HSE will report lower levels of psychological discomfort and less defensive responses, alongside more positive attitudes and intentions towards the recommended health behavior, compared to their unaffirmed counterparts. By contrast, it is expected that for those with LSE, self-affirmation will lead to higher levels of psychological discomfort and more defensive responses, alongside less positive attitudes and intentions towards the recommended health behavior, compared to their unaffirmed counterparts (See *Figure 1.4*).

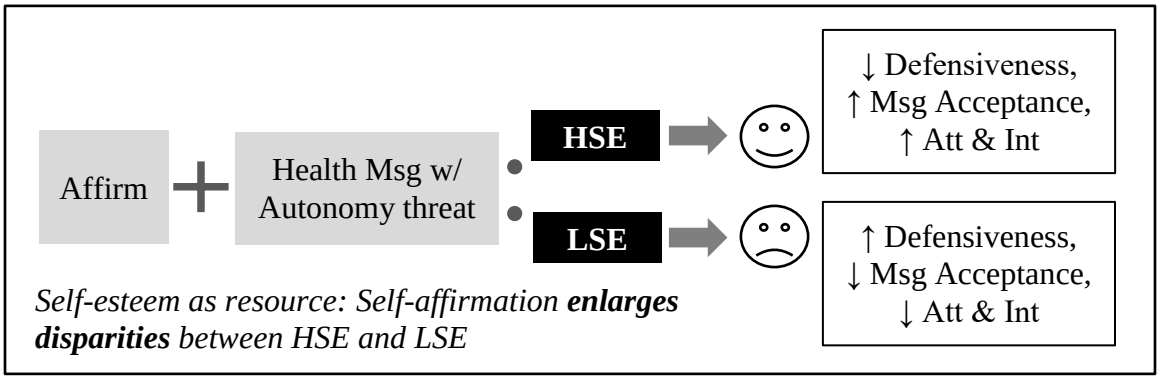


Figure 1.4 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior

Adequacy of the Affirmed Self

A closer look at previous research revealed that the studies that reported that self-affirmation enlarges the disparities between people with HSE and LSE differ from the studies that reported that self-affirmation reduces the disparities between people with HSE and LSE in the type of self-affirmation manipulations used. Participants in the former studies typically affirmed a range of cherished values or the global self-evaluations while those in the latter studies typically reflected on one important value. For example, Steele, Spencer, and Lynch (1993), whose findings showed that self-affirmation enlarged the disparities between people with HSE and LSE, used the Rosenberg self-esteem scale (Rosenberg, 1965) as the self-affirmation manipulation. Completing the Rosenberg scale directs people to reflect on their global self-evaluations (e.g., "On the whole, I am satisfied with myself," "I take a positive attitude toward myself"). In contrast, Düring and Jessop (2014), whose findings showed that self-affirmation reduced disparities between people with HSE and LSE, used the essay format self-affirmation manipulation where individuals wrote about their most important values. It is likely that reflecting on a range of values or the global self-evaluations versus reflecting on one's most important value produced different effects on the sense of self-integrity and in turn had different implications for people with HSE and LSE.

Writing about the most important value directs people's attention to the aspect of the self that one is most proud of, whereas affirming a range of values or reminding people their global self-evaluations may bring to mind not only the proudest moments but

also the unsatisfactory ones. For people with LSE, such unsatisfactory moments may be much more frequent and salient than the proud ones, but for people with HSE, they may find that they are performing well in most aspects of their lives, which further boosts their self-evaluations. Therefore, affirming the most important value achieves an adequate sense of self-integrity for both people with HSE and LSE. It thus brings people with LSE in line with people with HSE in terms of self-evaluations. When confronted with self-threatening information, with a salient positive self-conception to fall back on, self-affirmed people with LSE will find the information less threatening, exhibit less defensive responses, and show higher information acceptance, compared to their unaffirmed counterparts. For people with HSE, one salient positive self-aspect does not add much extra goodness to their existing high self-evaluations. They thus will not show much improvement in terms of defensiveness reduction or information acceptance, compared to their unaffirmed counterparts.

On the contrary, reflecting on a range of values or on one's global self-evaluation boosts the high self-regards of people with HSE but reminds people with LSE that their proud moments are scarce and the self is inadequate. When confronted with self-threatening information, with a salient sense of self-integrity, people with HSE will find the information less threatening, exhibit less defensiveness, and show higher information acceptance, compared to their unaffirmed counterparts. However, for people with LSE, when they are made aware that the self may not be adequate, they not only will show no improvement in terms of defensiveness reduction or information acceptance, but may

even exhibit higher defensiveness and lower information acceptance, compared to their unaffirmed counterparts (See *Figure 1.5*).

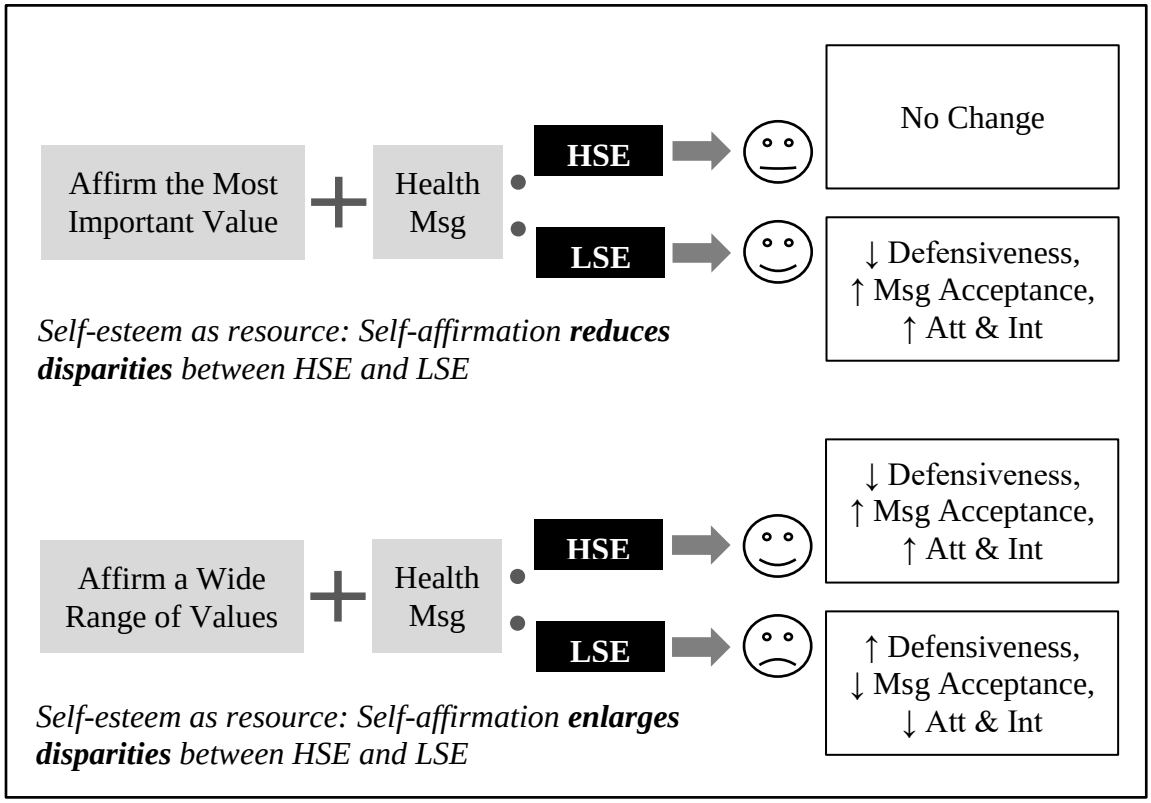


Figure 1.5 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior, as a function of the adequacy of affirmed self

Timing of Self-affirmation

A situation-level factor that may influence when self-affirmation benefits people with HSE versus LSE is the timing of self-affirmation manipulation – whether self-affirmation is induced before or after the onset of the threat to self (i.e., health message exposure). It influences self-affirmation effects by determining whether self-esteem functions as *resources* or as *expectancies* (Stone, 1999).

Self-affirming *before* health message exposure enables self-esteem to function as *resources*, because self-affirmation brings favorable knowledge about the self into the working memory before the threat to the self occurs. These cognitions then help offset the self-threat's discomforting implications for the self. If self-affirmation happened *before* message exposure, positive cognitions about the self are in place when the threat strikes. People who have more favorable self-resources available (i.e., have a secure sense of self-integrity) will be more capable to withstand the threat. Therefore, people with HSE will benefit from self-affirmation (e.g., show reduced defensiveness and increased message acceptance) if they affirmed a wide range of self-aspects, while people with LSE will benefit if they affirmed the most important and positive self-aspect.

If self-affirmation happened *after* message exposure, self-affirmation may backfire for people with HSE (Stone, 1999), regardless of affirming a wide range of self-aspects or the most important self-aspect. This is because completing a self-affirmation task after message exposure enables self-esteem to function as *expectancies.* Message exposure makes people aware of the link between a given behavior and a certain health

risk. Self-affirmation manipulation, which directs attention to the self, may cause self-referencing and make one's standards and self-expectancies salient (Hull & Levy, 1979; Hull et al., 2002), which may highlight any discrepancies between one's standards or self-expectancies and one's health-compromising behavior (e.g., "I always make wise decisions, but I smoke which puts my health at great risk").

For people with HSE, who have higher expectations for being competent and prudent than people with LSE, reading a health message and next directing attention to the self through the self-affirmation manipulation may trigger greater discomfort, because the blow to their sense of self-integrity is greater than for people with LSE. They thus may be more likely to resort to defensive processing than self-affirmed people with LSE. Also, compared to their unaffirmed counterparts, self-affirmed people with HSE will show increased defensiveness, because self-affirmation made salient the discrepancy between their high self-expectations and their health-compromising behavior. In contrast, for people with LSE, who have lower expectations for being competent and prudent, because the discrepancy between the standard or self-expectancy and the health-compromising behavior is smaller, a health message coupled with self-directed attention may not arouse much discomfort and thus may not increase defensiveness, compared to their unaffirmed counterparts (See *Figure 1.6*).

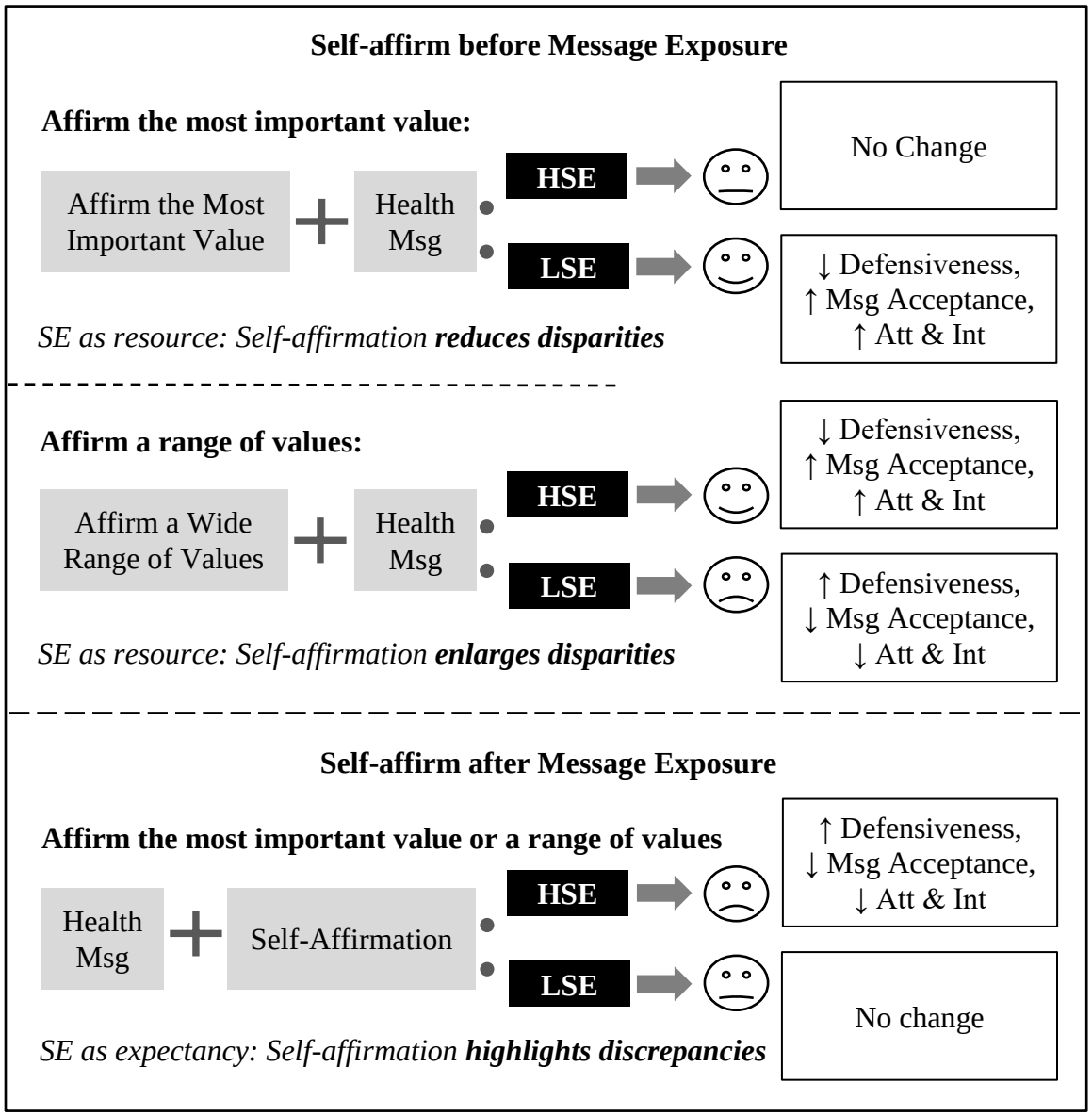


Figure 1.6 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior, as a function of the timing of the self-affirmation

Overview of Studies

This dissertation tests the moderating role of self-esteem in self-affirmation effect on reducing defensive processing of personally relevant health messages. Three studies test under what circumstances each of the three propositions apply (i.e., (1) self-esteem reflects self-affirmational resources and self-affirmation enlarges the disparities between people with HSE and LSE; (2) self-esteem reflects self-affirmational resources, and self-affirmation reduces the disparities between people with HSE and LSE; (3) self-esteem reflects self-expectancies and self-affirmation makes salient the discrepancies).

Study 1 (presented in Chapter 2) will test whether the proposition that self-esteem functions as resources and that self-affirmation enlarges the disparities between people with HSE and LSE – which only has been demonstrated in free-choice dissonance situations – can be replicated in the health communication context, specifically, when a health message induces autonomy threat through the use of controlling language. It is hypothesized that in the high autonomy threat condition, self-affirmed people with HSE will exhibit less defensive responses and higher message acceptance than their unaffirmed counterparts; while self-affirmed people with LSE will exhibit more defensive responses and lower message acceptance than their unaffirmed counterparts.

Study 2 (presented in Chapter 3) will test the adequacy of the affirmed self achieved through self-affirmation manipulation influences the moderating role of self-esteem. Three self-affirmation tasks that varied in terms of the range and the importance of the values addressed will be used. It is hypothesized that affirming a range of values

(e.g., scale affirmation) will reduce defensiveness among people with HSE but not for people with LSE, affirming a value more important than the value threatened will reduce defensiveness among people with LSE but less so for people with HSE, and affirming a value less important than the value threatened will increased defensiveness for people with LSE but not HSE.

Study 3 (presented in Chapter 4) will test whether the timing of the self-affirmation manipulation in relation to message exposure (i.e., whether self-affirmation is induced before or after message exposure) determines when self-esteem functions as *resources* versus *expectancies*. It is hypothesized that when self-affirmation is induced *before* message exposure, self-affirmed people with HSE will benefit more (i.e., show reduced defensiveness and increased message acceptance) if they affirmed a range of self-aspects, while people with LSE will benefit more if they affirmed the most important and positive self-aspect. When self-affirmation is induced *after* message exposure, regardless of affirming a range of values or the most important value, self-affirmed people with HSE will exhibit more defensiveness and lower message acceptance compared to their unaffirmed counterparts; while this difference will be weaker or even absent for people with LSE.

CHAPTER 2: STUDY 1 – DOMAIN OF SELF-THREAT

Abstract

The present study tested whether the proposition that self-esteem functions as resources and that self-affirmation enlarges the disparities between people with HSE and LSE (Steele, Spencer, & Lynch, 1993) applies in the health communication context, and specifically when a health message features an autonomy threat. It was expected that self-affirmation will reduce defensiveness, increase message acceptance, attitude, and intention among people with HSE, but will increase defensiveness, reduce message acceptance, attitude, and intention among people with LSE.

Contrary to the expectations, data on sunscreen use from 115 UMN college students showed that self-affirmation increased psychological discomfort, self-directed negative emotions, sunscreen use attitude, and sunscreen use intention among people with LSE but decreased them among people with HSE.

Introduction

Extant research on self-affirmation in the health communication domain mainly focused on identifying main effects of self-affirmation on reducing defensive responses and increasing openness toward health messages. The small effect sizes and inconsistencies reported in recent reviews of self-affirmation research in the health communication domain (e.g., Cohen & Sherman, 2014; Epton et al., 2015) call for more attention on the boundary conditions of self-affirmation effects.

Self-esteem, one's global evaluation or attitude relating to the self (Rosenberg, 1965), is an individual level factor that has complex yet important relationships with health outcomes. People with high self-esteem has been found to be more resilient in the face of stress and physical diseases (e.g., Broers et al., 1998) but also are more likely to discount vulnerability to health risks (e.g., Gerrard et al., 2000). Low self-esteem, however, has been found to associate with psychiatric vulnerability and more health-compromising behaviors (e.g., Mann et al., 2004).

Conceptually, self-esteem and self-affirmation are closely related. Self-esteem approximates one's self-adequacy while self-affirmation reflects efforts to secure the sense of self-adequacy when it is threatened. People with high self-esteem (HSE) and low self-esteem (LSE) may have very different ideas about to what extent the self is considered adequate and may thus respond differently to self-affirmation manipulations.

Steele, Spencer, and Lynch (1993) suggests that self-esteem can function as resources: people with HSE have more favorite knowledge about themselves, hence have

more chronic self-affirmational resources in the face of threat, while people with LSE have less favorite knowledge about themselves, hence have less chronic self-affirmational resources in the face of threat. When the self-affirmational resources are made accessible through self-affirmation manipulation, people with HSE will be more resilient in the face of self-threats because they are made aware of their large reservoir of self-resources. Therefore, they will show reduced defensive responses to self-threats compared with their unaffirmed counterparts. In contrast, people with LSE may find the self-threat more threatening because they are made aware of their lack of positive knowledge about themselves. Therefore, they will show increased defensive responses to self-threats compared with their unaffirmed counterparts.

This proposition that self-affirmation enlarges the disparities between people with HSE and LSE has been supported in research examining self-affirmation effect in reducing justification resulted from free-choice dissonance situations. However, in the context of health message processing, so far no study has demonstrated such effects. Therefore, in this study, I will test whether this proposition applies in a health communication context where an autonomy threat is featured in the health message. It is expected that self-affirmed individuals with HSE will report lower defensive responses, higher message acceptance, more positive attitudes, and higher intentions toward the recommended health behavior, compared to their unaffirmed counterparts. By contrast, self-affirmed individuals with LSE will report higher defensiveness, as well as lower

message acceptance, less positive attitudes, and lower intentions toward the recommended health behavior (See *Figure 2.1*).

Given that I planned to conduct the study with a college student sample, I chose daily sunscreen use as the behavior. Protecting skin from UV overexposure is a health topic relevant to the college student population that tends to spend a large amount of time outdoors. Also, the study was conducted toward the end of the Spring semester when summer break was approaching and UV overexposure was becoming especially relevant.

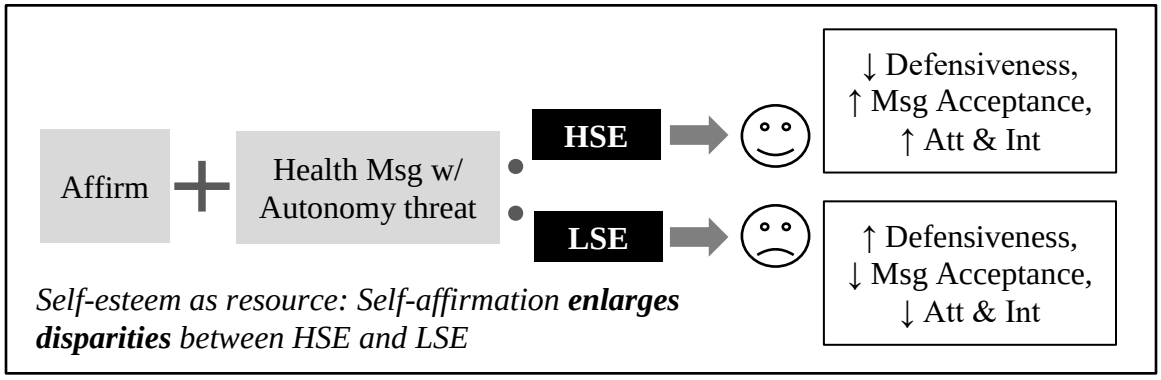


Figure 2.1 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior

Method

Participants

A total of 173 undergraduate students from the University of Minnesota participated in the study for extra course credits. A total of 143 participants completed both a pre-study questionnaire and the main study two weeks later (retention rate: 82.7%). Responses from 20 participants were excluded because of "click-through patterns," that is, these participants chose the same answer to all Likert-type scale items at multiple parts of the questionnaire. Eight participants did not complete the survey questions continuously within an hour, that is, they stopped answering questions at some point then after a while came back to answer the rest of the questions. Responses from these participants were excluded from analysis as well. The ages of remaining participants ranged from 18 to 26 years with an average age of 20.1 (*Median* = 20; *SD* = 1.6). Of all participants, 70.4% were female (n = 81). A total of 72.2% of participants were White (n = 83), 20.9% were Asian (n = 24), and 6.9% were multiracial or other (n = 8) (See *Appendix A.1* for sample characteristics).

Design and Procedure

An experiment with a 2 (Self-affirmation: yes, no) by 2 (Level of autonomy threat in message: low, high) between-subjects factorial design was conducted online. Two weeks before the study, all participants completed a pre-study questionnaire that included the Rosenberg self-esteem scale (1965), measures of sunscreen use history, and

demographics information. Two weeks later, participants were randomly assigned to one of the four experimental conditions. Participants in the self-affirmation condition were asked to write a short essay about their most important value, why it is important to them, and how they have used it in life. They were instructed to describe specific occasions when this value determined their actions (Harris & Napper, 2005). In the no self-affirmation control condition, participants wrote about how digital media influenced the ways people get news, follow TV shows, and consume music. Next, participants received a health message. The messages in the low and high threat conditions differed in the extent to which controlling language was used. Last, participants filled out a questionnaire that included measures of the key variables of interest.

Stimuli

To develop stimuli for study 1, information from the Center for Disease Control and Prevention (CDC) was used to create contents for two messages about sunscreen use. The messages were comprised of a brief introduction, a list of harmful consequences of UV overexposure, and a conclusion section where sunscreen use recommendations were laid out. Aesthetic elements were added to make the messages look like real health messages that people may see in the media environment.

Based on psychological reactance research in the health communication domain (e.g., Miller et al., 2007; Quick & Stephenson, 2008), autonomy threat in the messages was manipulated by using controlling language to recommend sunscreen use, or, alternatively, using non-coercive, autonomy supporting language. The high autonomy

threat message contained controlling terms such as “should” and “must” and included phrases such as “You simply cannot deny that,” “You simply have to do it,” and “You do not have a choice.” The low autonomy threat message contained non-coercive terms such as “can,” “may,” and “might” and included autonomy-supportive phrases such as “An option for you to consider,” “The choice is yours,” and “Now might be a good time to give it a try.”

A pilot test was conducted to examine whether the messages can successfully induce high and low levels of perceived autonomy threat. A total of 28 participants were randomly assigned to the two message conditions. Among all participants, 13 read the high autonomy threat message and 15 read the low autonomy threat message. After reading the messages, participants answered manipulation check questions that assessed their perceptions of autonomy threat.

The **perceived autonomy threat manipulation check** was comprised of eight 7-point items based on Dillard and Shen (2005), with four items adopted from the original Dillard and Shen measure (e.g., “The message tried to make a decision for me,” 1 = “Strongly disagree” – 7 = “Strongly agree”) and four items created specifically for the sunscreen use behavior (e.g., “The message tried to restrict my freedom over sunscreen use”; $\alpha = .845$). The analysis showed that although the high threat message induced higher levels of perceived autonomy threat ($M = 3.94$, $SD = 1.13$) than the low threat message ($M = 3.10$, $SD = .96$, $d = .39$, $t(26) = 2.13$, $p = .043$), the mean levels of perceived autonomy threat induced from the high threat message did not pass the scale

midpoint "4." Therefore, to strengthen the autonomy threat in the high threat condition, a new message was created with stronger controlling language. For example, the title of the message was changed from "A Choice You Have to Make" to "You Do Not Have a Choice." In addition, in order to make the controlling or the polite language more salient and to reduce cognitive load, I shortened the middle section where harmful consequences of sun overexposure were listed.

The revised sunscreen use messages were used as the stimuli in study 1[1]. Participants assigned to the high autonomy threat condition read the message that contains controlling language and participants assigned to the low autonomy threat message read the message that contains non-coercive, polite language. Participants completed the perceived autonomy threat manipulation check after they finished reading the messages (See *Figure 2.2* and *Figure 2.3* for the messages).

[1] The revised messages were not pilot-tested before the main study because I speculated that the use of the stronger controlling language would sufficiently induce higher levels of autonomy threat. The manipulation check later showed that the messages successfully induced high versus low levels of autonomy threat.

Figure 2.2 Low autonomy threat sunscreen use message

Figure 2.3 High autonomy threat sunscreen use message

Key Measures

Self-esteem was measured with the Rosenberg self-esteem scale (1965). Participants responded to ten 7-point scale items, such as "On the whole, I am satisfied with myself," "I feel that I'm a person of worth, at least on an equal plane with others," and "I wish I could have more respect for myself" (1 = "Strongly disagree" – 7 = "Strongly agree"). Five items were reverse scored. Participants' average scores of the ten items were used as the indicator of self-esteem ($\alpha = .891$; $M = 4.96$, $SD = 1.02$).

It is important to note that although the mean self-esteem score was considerately higher than the scale midpoint "4," finding a high mean self-esteem score was consistent with previous research which shows that responses to the Rosenberg Scale were generally on the positive side of the scale, especially with U.S. college student samples (e.g., Blascovich & Tomaka, 1991; Schmitt & Allik, 2005; Twenge & Campbell, 2001). For example, Twenge and Campbell's meta-analysis (2001) showed that the mean self-esteem score among college students was 32.27 (Range: 10 – 40; Scale midpoint: 25) and the mean score increased over time. Because it is socially desirable to have high rather than low self-esteem, it is likely that some people scored themselves more positively on the scale than what their true self-evaluations are.

Indicators of Defensive Processing

Psychological Discomfort was measured with three 7-point scale items adapted from Elliot and Devine (1994). "I feel uncomfortable," "I feel uneasy," and "I feel bothered" followed the stem "Please indicate how you are feeling right now" (1 = "None

of this feeling" – 7 = "A great deal of this feeling"). The mean of the three items was used as the composite score for psychological discomfort (α = .745; *M* = 2.74, *SD* = 1.34).

Anger was measured with two 7-point scale items adapted from Shen and Dillard (2005), "I feel irritated" and "I feel angry" (1 = "None of this feeling" – 7 = "A great deal of this feeling"). The mean of the two items was used as the composite score for anger (*r* = .599; *M* = 2.4, *SD* = 1.36). To reduce experimental demand concerns, I included additional items to measure self-directed negative emotions ("I feel disappointed with myself," "I feel annoyed with myself," and "I feel guilty"; α = .837; *M* = 2.56, *SD* = 1.49) and positive emotions ("I feel happy," "I feel optimistic," "I feel cheerful," and "I feel content"; α = .916; *M* = 4.13, *SD* = 1.54).

Message skepticism was measured with the 7-point scale item "While reading the message, I was skeptical of what was being said" (1 = "Strongly disagree" – 7 = "Strongly agree"; *M* = 3.67, *SD* = 1.65).

Indicators of Message Acceptance

A 7-item, 7-point bipolar semantic differential scale adopted from Yzer et al., (2011) was used to measure message acceptance. The stem phrase "To me, the message was:" was anchored with seven word pairs. The first four items, "extremely unconvincing – extremely convincing," "extremely unbelievable – extremely believable," "extremely forgettable – extremely memorable," and "extremely bad – extremely good," measured **perceived convincingness** (α = .714; *M* = 4.08, *SD* = 1.04). The fifth and sixth items,

"extremely unpleasant – extremely pleasant" and "extremely negative – extremely positive" measured **perceived pleasantness** (r = .615; M = 3.35, SD = 1.2). The last item, "extremely not meant for someone like me – extremely meant for someone like me," measured **perceived relevance** (M = 4.22, SD = 1.67).

Sunscreen Use Attitude and Intentions

Eight 7-point (1 – 7) bipolar semantic differential scale items were used to measure **attitude** towards using sunscreen daily, namely "unpleasant-pleasant," "annoying-nice," "stressful-calming," "frightening-assuring," "negative-positive," "bad-good," "harmful-beneficial," and "worthless-useful." The average score of the eight items was used as an overall measure of attitude (α = .870; M = 4.81, SD = 0.96).

Intention to use sunscreen daily was measured by a 7-point scale item – "How likely are you to use sunscreen every day you would be out in the sun?" (1 = "Very unlikely" – 7 = "Very likely"; M = 3.73, SD = 1.86). Given that the study was conducted between mid-April and early-May when UV radiation was low to moderate in Minnesota and that sun protection is more relevant for the college student population in the summer months than in other months of the year, participants' daily sunscreen use intentions may be influenced by the temporal contexts of the behavior. Therefore, three additional intention measures were used to assess daily sunscreen use intention in three time frames. Intention to use sunscreen daily in the **following week** was measured by a 7-point scale item – "How likely are you to use sunscreen every day you would be out in the sun in the following week?" (1 = "Very unlikely" – 7 = "Very likely"; M = 3.20, SD = 1.74).

Intention to use sunscreen daily in the **following month** was measured by a 7-point scale item – "How likely are you to use sunscreen every day you would be out in the sun in the following month?" (1 = "Very unlikely" – 7 = "Very likely"; *M* = 3.93, *SD* = 1.91). Intention to use sunscreen daily in **next three months** was measured by a 7-point scale item – "How likely are you to use sunscreen every day you would be out in the sun in next three months?" (1 = "Very unlikely" – 7 = "Very likely"; *M* = 4.23, *SD* = 1.91).

Control Variables

Controlling for variables that are correlated with the dependent variable but uncorrelated with the independent variables in a regression model can reduce error variance without inducing multicollinearity and thus increase the precision of the estimated treatment effects (Wooldridge, 2015). I thus selected two variables that might have independent effects on the dependent variables as intended control variables for the analyses: current sunscreen use behavior and gender.

Current Sunscreen Use. Regardless of self-affirmation manipulation, people who currently use sunscreen may report lower defensiveness and higher message acceptance because the message is consistent with their current position on the behavior. Also, current behavior is a major source for attitudinal beliefs and behavior intention and therefore is a strong predictor of attitude and intention. I measured participants' current sunscreen use behavior in the pre-study questionnaire two weeks before the main study with the question: "Which statement best describes your current use of sunscreen?" (1 = "I do not use it at all" – 5 = "I use it every day"; *M* = 2.87, *SD* = 0.79). I examined the

correlations between current sunscreen use behavior and the dependent and the independent variables within each experimental condition to determine whether it is useful to include current sunscreen use behavior as a control variable in the analyses. The correlations between current sunscreen use behavior and the dependent variables were very weak except for perceived relevance and attitude and intention measures (See *Table 2.1*). Therefore, current sunscreen use behavior was included as a control variable only for the analysis on ***message skepticism***, ***perceived relevance***, ***attitude***, and ***intention***.

Gender. There are fairly well-established gender differences in sun protection behaviors and beliefs (e.g., Abroms et al., 2003; Thieden et al., 2005). For example, women usually have more favorable attitudes toward sunscreen use and are more likely to use sunscreen than men. Therefore, gender was included as an intended control variable as well. Similarly, I examined the associations between gender and the dependent and independent variables using Spearman correlation to determine whether it is useful to include gender as a control variable in the analyses. Gender had moderate correlations with indicators of defensiveness (i.e., psychological discomfort, anger, and message skepticism) and the attitude and intention measures (See *Table 2.1*). Therefore, it was included as a control variable in analyses of these dependent variables.

Table 2.1 Bivariate Correlations between the Intended Control Variables and Dependent and Independent Variables by Experimental Condition

	Current Sunscreen Use				Gender[2]			
	Control		Self-Affirmed		Control		Self-Affirmed	
Threat Level	Low	High	Low	High	Low	High	Low	High
Self-esteem	-.19	.32†	.09	.46*	-.38*	-.01	.19	-.10
Discomfort	-.01	.33†	.01	-.18	.45*	.60**	-.44*	-.04
Anger	-.01	.34†	.00	.02	.51**	.54*	-.15	-.14
Skepticism	.04	-.15	-.41*	-.00	-.06	-.23	-.53**	-.28
Perc. Conv.	-.01	.03	.28	.30	.04	.12	.20	.09
Perc. Plea.	-.30	.09	-.11	.28	-.13	-.12	.11	.31
Perc. Relevance	.14	.22	.41*	.19	.08	-.12	.36†	.05
Attitude	.54**	.46**	.37†	.67***	-.06	.16	.50**	.26
Intention	.46*	.73***	.60**	.72***	.00	.19	.47*	.19
Int (Next wk)	.38†	.67***	.57**	.66***	.19	.37*	.17	.20
Int (Next mo)	.35†	.66***	.50*	.67***	.12	.34†	.47*	.22
Int (Next 3 mo)	.33	.61***	.46*	.60**	-.07	.35†	.52**	.37*

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Gender: Male = 0, Female = 1.

[2] The associations between gender and other variables were analyzed using Spearman correlation.

Results

Preliminary Analysis

The effectiveness of the stimuli in inducing high versus low levels of autonomy threat was confirmed with the perceived autonomy threat manipulation check (α = .918; See p. 62 for scale items). The high threat message induced higher levels of perceived autonomy threat (M = 5.31, SD = 1.16) than the low threat message (M = 3.62, SD = 1.26), d = 1.40, $t(110)$ = -7.416, p = .000.

At the data cleaning stage, I discovered that the length of the value affirmation essays varied greatly between participants, ranging from three individual words (e.g., "health, happiness, love") to a long essay with 262 words. The average length of the essay was 79 words (SD = 49.86). It is conceivable that whether participants in the self-affirmation condition were self-affirmed varied depending on whether they followed the self-affirmation task instruction in writing the value essay, as well as the amount of cognitive effort they put into the task. Therefore, to determine whether the self-affirmation manipulation fulfilled its intended purpose, i.e., leading participants to reflect on aspects of the self that are important and positive, I examined whether participants closely followed the instructions to complete the self-affirmation task.

The value essays were coded by two independent coders following a coding scheme adapted from Tesser et al. (2000). The judges rated each of the value essays with respect to the following three questions (Yes = 1, No = 0): (1) Did the essay allow one to

get to know the writer and how the value pertained to the writer personally? (2) Did the essay present positive information that seemed to cast the writer in a positive light? (3) Did the essay explain why the value was important to the writer? (Percent agreement = 95.4%, 93.8%, 90.8%; disagreements were resolved through discussion.) Five participants whose essay received zero for all three questions were considered as not self-affirmed and were regrouped into the control condition.

Descriptive Statistics

The bivariate correlations and descriptive statistics of key variables are presented in *Table 2.2* to *Table 2.5* by threat conditions.

Table 2.2 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in Low Threat Condition

n = 56					Self-esteem: *M* (*SD*) = 5.00 (0.97)
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Defensiveness***					
	Discomfort		Anger		Msg. Skepticism
Self-affirmation	-.13		-.08		-.04
Self-esteem	-.20		-.20		-.02
M (*SD*)	2.70 (1.28)		2.40 (1.27)		3.48 (1.60)
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Message Acceptance***					
	Perc. Convincingness		Perc. Pleasantness		Perc. Relevance
Self-affirmation	-.17		.01		-.23
Self-esteem	.04		.01		.14
M (*SD*)	4.30 (0.87)		3.78 (0.95)		4.43 (1.56)
Correlations between Self-Affirmation, Self-Esteem, and ***Measures of Attitude and Intention***					
	Attitude	Intention	Int. (Next wk.)	Int. (Next mo.)	Int. (Next 3 mos.)
Self-affirmation	-.32*	-.00	.03	.05	-.01
Self-esteem	.08	.16	-.09	.14	.28*
M (*SD*)	4.82 (0.95)	3.89 (1.73)	3.26 (1.71)	3.98 (1.80)	4.43 (1.77)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skepticism refers to Message Skepticism. Perc. Convincingness refers to Perceived Convincingness. Perc. Pleasantness refers to Perceived Pleasantness. Perc. Relevance refers to Perceived Relevance. Int. refers to Intention.

Table 2.3 Bivariate Correlations between All Dependent Variables in Low Threat Condition

n = 56	1	2	3	4	5	6	7	8	9	10	11
1. Discomfort	-										
2. Anger	.67***	-									
3. Msg. Skepticism	.27†	.23	-								
4. Perc. Convincingness	-.07	-.24†	-.35*	-							
5. Perc. Pleasantness	-.28*	-.37**	-.09	.20	-						
6. Perc. Relevance	.04	-.17	-.24†	.50***	.02	-					
7. Attitude	-.01	.02	.07	.10	-.08	.18	-				
8. Intention	.02	-.13	-.07	.03	.03	.15	.40**	-			
9. Int. (Next week)	.08	.05	.01	.02	-.06	-.00	.33*	.60***	-		
10. Int. (Next month)	.11	.04	-.10	-.03	-.08	.11	.41*	.74***	.63**	-	
11. Int. (Next 3 months)	.14	.00	-.10	.14	-.12	.25†	.46**	.63***	.37**	.77***	-

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skepticism refers to Message Skepticism. Perc. Convincingness refers to Perceived Convincingness. Perc. Pleasantness refers to Perceived Pleasantness. Perc. Relevance refers to Perceived Relevance. Int. refers to Intention.

Table 2.4 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in High Threat Condition

n = 59				Self-esteem: *M* (*SD*) = 4.92 (1.06)	
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Defensiveness***					
	Discomfort		Anger		Msg. Skepticism
Self-affirmation	.02		.20		.04
Self-esteem	-.25†		-.20		-.07
M (*SD*)	2.79 (1.41)		2.40 (1.45)		3.83 (1.68)
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Message Acceptance***					
	Perc. Convincingness		Perc. Pleasantness		Perc. Relevance
Self-affirmation	-.12		.06		.02
Self-esteem	-.03		.14		-.05
M (*SD*)	3.89 (1.15)		2.96 (1.27)		4.03 (1.76)
Correlations between Self-Affirmation, Self-Esteem, and ***Measures of Attitude and Intention***					
	Attitude	Intention	Int. (Next wk.)	Int. (Next mo.)	Int. (Next 3 mos.)
Self-affirmation	.04	.08	-.03	.03	.09
Self-esteem	.37**	.40**	.14	.25†	.22
M (*SD*)	4.81 (0.99)	3.59 (1.98)	3.14 (1.79)	3.86 (2.01)	4.05 (2.03)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skepticism refers to Message Skepticism. Perc. Convincingness refers to Perceived Convincingness. Perc. Pleasantness refers to Perceived Pleasantness. Perc. Relevance refers to Perceived Relevance. Int. refers to Intention.

Table 2.5 Bivariate Correlations between All Dependent Variables in High Threat Condition

n = 59	1	2	3	4	5	6	7	8	9	10	11
1. Discomfort	-										
2. Anger	.73***	-									
3. Msg. Skepticism	-.09	-.05	-								
4. Perc. Convincingness	.02	-.17	-.46***	-							
5. Perc. Pleasantness	-.26*	-.28*	-.24†	.53***	-						
6. Perc. Relevance	-.01	-.17	-.29*	.65***	.43**	-					
7. Attitude	.10	.18	-.09	.19	.38**	.21	-				
8. Intention	.01	.04	.00	.03	.22†	.14	.59***	-			
9. Int. (Next week)	.22†	.27*	-.07	.18	.17	.30*	.63***	.69***	-		
10. Int. (Next month)	.21	.23†	-.12	.12	.22†	.31*	.65***	.77***	.85***	-	
11. Int. (Next 3 months)	.19	.24†	-.16	.12	.19	.27*	.53***	.69***	.77***	.86***	-

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skepticism refers to Message Skepticism. Perc. Convincingness refers to Perceived Convincingness. Perc. Pleasantness refers to Perceived Pleasantness. Perc. Relevance refers to Perceived Relevance. Int. refers to Intention.

Outline of Results

Overall, in the high threat condition, regression analyses revealed interactions between self-esteem and self-affirmation on psychological discomfort, attitude, and intention toward daily sunscreen use (See *Table 2.6*).

In the following sections, I will present the results in the following order: (1) effects on indicators of defensiveness, (1) effects on indicators of message acceptance, and (3) effects on attitude and intention. Next, supplemental analyses will be provided to aid further understanding the findings.

Table 2.6 Outline of Study 1 Results

Dependent Variables		**Interaction Effects**	**Main Effects**
Indicators of Defensiveness	Discomfort	High threat: Affirm x SE	-
	Anger	-	High threat: SE (-); Affirm (+)
	Skepticism	-	-
Indicators of Message Acceptance	Perc. Convincingness	-	-
	Perc. Pleasantness	-	-
	Perc. Relevance	-	-
Attitude and Intention Measures	Attitude	High threat: Affirm x SE	Low threat: Affirm (-)
	Intention	-	-
	Int. (Next week)	High threat: Affirm x SE	-
	Int. (Next month)	High threat: Affirm x SE	-
	Int. (Next 3 months)	-	Low threat: SE (+)

Note. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Perc. refers to Perceived. Int. refers to Intention.

1. Role of Self-Esteem in Self-Affirmation Effects on Defensiveness

A series of hierarchical regression analyses were conducted to examine the hypothesis that self-affirmation decreases the defensive responses towards the high threat health message among people with HSE but increases defensive responses among people with LSE. Such effects would be indicated by interactions between self-affirmation and self-esteem in regression models with indicators of defensive processing as the dependent variables. Two regression models were built for the low and high threat conditions for each dependent variable.

In regression models for ***psychological discomfort***, dummy-coded gender (Male = 0, Female = 1) was entered at step 1 as a control variable, mean-centered self-esteem and dummy-coded self-affirmation (Self-affirmed = 1, Control = 0) were entered at step 2, and the two-way interaction term of self-esteem x self-affirmation was entered at step 3. In regression models for ***anger***, mean-centered self-esteem and dummy-coded self-affirmation (Self-affirmed = 1, Control = 0) were entered at step 1, and the two-way interaction term of self-esteem x self-affirmation was entered at step 2. In regression models for ***message skepticism***, mean centered current sunscreen use and dummy-coded gender (Male = 0, Female = 1) were entered at step 1 as control variables, mean-centered self-esteem and dummy-coded self-affirmation (Self-affirmed = 1, Control = 0) were entered at step 2, and the two-way interaction term of self-esteem x self-affirmation was entered at step 3. When an interaction effect was identified, simple slopes analyses were conducted to examine the nature of the interaction (Aiken & West, 1991), specifically,

the dependent variable was regressed onto self-affirmation for participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem.

Psychological Discomfort

Low Threat Condition. As expected, no interaction or main effect of self-esteem or self-affirmation was found (See *Table 2.7* for regression analysis results).

High Threat Condition. The regression analysis showed an interaction between self-affirmation and self-esteem on psychological discomfort, $\Delta R^2 = .079$, $b = -.757$, $t(54) = -2.33$, $p = .024$ (See *Table 2.8* for regression analysis results). Simple slope analyses showed that among participants with LSE (-1SD), self-affirmation had a positive effect on psychological discomfort, $b = .901$, $t(54) = 1.87$, $p = .067$. Although the slope for participants with HSE (+1SD) was not statistically significantly different from zero, $b = -.709$, $t(54) = -1.45$, $p = .153$, it was sufficiently lower than the slope for participants with HSE ($Z = -2.34$, $p = .010$, one tailed).

Consistent with the proposition1 (Self-esteem as resource: Self-affirmation enlarges disparities), self-affirmed participants with LSE showed higher psychological discomfort compared to their unaffirmed counterparts, while self-affirmed people with HSE showed lower psychological discomfort compared to their unaffirmed counterparts (See *Figure 2.4*).

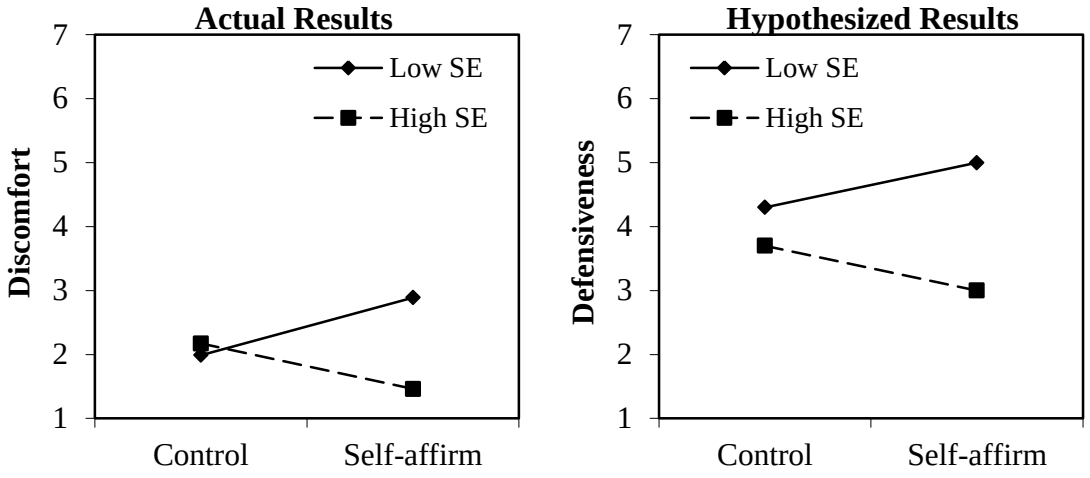


Figure 2.4 Self-affirmation x self-esteem effect on psychological discomfort in the high threat message condition

Left: Predicted values for psychological discomfort among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for psychological discomfort among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Anger

Low Threat Condition. As expected, no interaction or main effect of self-esteem or self-affirmation was found (See *Table 2.7* for regression analysis results).

High Threat Condition. Unexpectedly, there was no interaction between self-affirmation and self-esteem on anger. At step 2 of the regression model, there was a main effect of self-affirmation, $R^2_{\text{Step 2}} = .091$, $b = .649$, $t(56) = 1.76$, $p = .085$, and a main effect of self-esteem, $b = -.314$, $t(56) = -1.79$, $p = .078$ (See *Table 2.8* for regression analysis results). This means that self-affirmed participants expressed higher levels of

anger than unaffirmed participants, regardless of their self-esteem levels and participants with HSE expressed lower levels of anger than participants with LSE, regardless of whether they were self-affirmed or not.

Message Skepticism

Unexpectedly, the regression analysis showed no interaction between self-affirmation and self-esteem on message skepticism, in either high or low threat condition. There was no self-affirmation or self-esteem main effect either (See *Table 2.7* and *Table 2.8* for regression analysis results).

Table 2.7 Regression Analyses with Defensiveness Measures as Dependent Variables in the Low Threat Condition

	Psychological Discomfort		Anger		Message Skepticism	
n = 53	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	2.82***	.35	2.57***	.24	4.16***	.47
Sunscreen Use	-	-	-	-	-.86†	.49
Gender	.16	.35	-	-	-.24	.32
Self-esteem	-.28	.18	-.28	.18	-.10	.24
Self-affirmation	-.39	.35	-.28	.34	-.34	.46
R^2 (ΔR^2 Step 2)	.068 (.057)		.050 (.050)		.101 (.101)	
(Constant)	2.75***	.36	2.57***	.25	4.35***	.49
Sunscreen Use	-	-	-	-	-1.05*	.51
Gender	.22	.37	-	-	-.25	.31
Self-esteem	-.17	.25	-.29	.24	-.39	.32
Self-affirmation	-.36	.35	-.29	.34	-.38	.46
Esteem x Affirm	-.24	.37	.08	.36	.66	.50
R^2 (ΔR^2 Step 3)	.075 (.008)		.051 (.001)		.134 (.033)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$.

Table 2.8 Regression Analyses with Defensiveness Measures as Dependent Variables in the High Threat Condition

	Psychological Discomfort		Anger		Message Skepticism	
n = 59	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	2.01***	.42	2.09***	.25	4.52***	.54
Sunscreen Use	-	-	-	-	-.98†	.57
Gender	.92	.44	-	-	.04	.31
Self-esteem	-.34	.17	-.31	.18	-.14	.23
Self-affirmation	.10	.36	.65	.37	.20	.45
R^2 (ΔR^2 Step 2)	.134 (.063)		.091 (.091)		.061 (.061)	
(Constant)	2.08***	.40	2.10***	.26	4.53***	.55
Sunscreen Use	-	-	-	-	-.98†	.58
Gender	.90*	.42	-	-	.04	.31
Self-esteem	.09	.24	-.24	.27	-.03	.33
Self-affirmation	.09	.34	.65†	.37	.19	.45
Esteem x Affirm	-.76*	.33	-.13	.36	-.18	.43
R^2 (ΔR^2 Step 3)	.213 (.079)		.093 (.002)		.064 (.003)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$.

2. Role of Self-Esteem in Self-Affirmation Effects on Message Acceptance

A series of hierarchical regression analyses were conducted to examine the hypothesis that self-affirmation increases the acceptance of the high threat health message among people with HSE but decreases message acceptance among people with LSE. Such effects would be indicated by interactions between self-affirmation and self-

esteem in regression models with indicators of message acceptance as the dependent variables. Two regression models were built for the low and high threat conditions for each dependent variable.

In regression models for ***perceived convincingness*** and ***perceived pleasantness***, mean-centered self-esteem and dummy-coded self-affirmation (Self-affirmed = 1, Control = 0) were entered at step 1 and the two-way interaction term of self-esteem x self-affirmation was entered at step 2. In regression models for ***perceived relevance***, mean centered current sunscreen use was entered at step 1 as a control variable, mean-centered self-esteem and dummy-coded self-affirmation were entered at step 2, and the two-way interaction term of self-esteem x self-affirmation was entered at step 3.

Unexpectedly, regression analyses showed no interaction between self-affirmation and self-esteem on any of the message acceptance indicators (i.e., perceived convincingness, perceived pleasantness, and perceived relevance), in either high or low threat condition. There was no main effect of self-esteem or self-affirmation, either (See *Table 2.9* and *Table 2.10* for regression analyses results).

Table 2.9 Regression Analyses with Message Acceptance Measures as Dependent Variables in the Low Threat Condition

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
n = 53	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	4.44***	.17	3.76***	.19	4.74***	.30
Sunscreen Use	-	-	-	-	.60*	.28
Gender	-	-	-	-	-	-

Self-esteem	.01	.13	.01	.14	.20	.22
Self-affirmation	-.29	.24	.02	.27	-.50	.43
R^2 (Step 2 ΔR^2)	.029 (.029)		.000 (.000)		.143 (.048)	
(Constant)	4.48***	.17	3.76***	.19	4.79***	.30
Sunscreen Use	-	-	-	-	.56†	.28
Gender	-	-	-	-	-	-
Self-esteem	-.15	.16	.09	.18	-.03	.29
Self-affirmation	-.30	.24	.02	.27	-.53	.43
Esteem x Affirm	.39	.26	-.22	.29	.54	.45
R^2 (Step 3 ΔR^2)	.072 (.044)		.012 (.012)		.169 (.026)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$.

Table 2.10 Regression Analyses with Message Acceptance Measures as Dependent Variables in the High Threat Condition

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
$n = 59$	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	4.02***	.21	2.91***	.23	4.01***	.32
Sunscreen Use	-	-	-	-	.57†	.31
Gender	-	-	-	-	-	-
Self-esteem	-.01	.14	.15	.16	-.26	.24
Self-affirmation	-.28	.30	.11	.34	.09	.46
R^2 (Step 2 ΔR^2)	.016 (.016)		.020 (.020)		.063 (.021)	
(Constant)	4.02***	.21	2.91***	.23	4.02***	.32
Sunscreen Use	-	-	-	-	.57†	.31
Gender	-	-	-	-	-	-
Self-esteem	-.00	.22	.16	.24	-.20	.34
Self-affirmation	-.28	.31	.11	.34	.08	.46
Esteem x Affirm	-.02	.29	-.01	.32	-.12	.44
R^2 (Step 3 ΔR^2)	.016 (.000)		.020 (.000)		.065 (.001)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$.

3. Role of Self-Esteem in Self-Affirmation Effects on Attitude and Intentions

A series of hierarchical regression analyses were conducted to examine the hypothesis that in the high threat message condition, self-affirmation increases attitudes and intentions toward daily sunscreen use among people with HSE but decreases attitudes and intentions among people with LSE. Such effects would be indicated by interactions between self-affirmation and self-esteem in regression models with attitude and intention towards daily sunscreen use as the dependent variables. Two regression models were built for the low and high threat conditions for each dependent variable. In each regression model, mean centered current sunscreen use and dummy-coded gender (Male = 0, Female = 1) were entered at step 1 as control variables, mean-centered self-esteem and dummy-coded self-affirmation condition (Self-affirmed = 1, Control = 0) were entered at step 2, and the two-way interaction term of self-esteem x self-affirmation was entered at step 3. When an interaction effect was identified, simple slopes analyses were conducted to examine the nature of the interaction (Aiken & West, 1991).

Attitude

Low Threat Condition. As expected, no interaction between self-affirmation and self-esteem was found on attitude toward using sunscreen daily. There was a main effect of self-affirmation, $\Delta R^2_{\text{Step 2}} = .064$, $b = -.453$, $t(51) = -1.91$, $p = .062$ (See *Table 2.11* for regression analysis results). This means that self-affirmed participants showed a less favorable attitude toward sunscreen use than unaffirmed participants, regardless of their self-esteem levels. There was no main effect of self-esteem.

High Threat Condition. The regression analysis showed an interaction between self-affirmation and self-esteem on attitude toward daily sunscreen use, $\Delta R^2 = .076$, $b = -.519$, $t(53) = -2.60$, $p = .012$ (See *Table 2.12* for regression analysis results). Simple slope analyses showed that among participants with LSE (-1SD), self-affirmation had a positive effect on attitude, $b = .517$, $t(53) = 1.74$, $p = .087$, while among participants with HSE (+1SD), self-affirmation had a negative effect on attitude, $b = -.587$, $t(53) = -1.95$, $p = .056$.

Contrary to the hypothesis, self-affirmed participants with LSE showed a more favorable attitude compared to their unaffirmed counterparts, while self-affirmed people with HSE showed a less favorable attitude compared to their unaffirmed counterparts (See *Figure 2.5*).

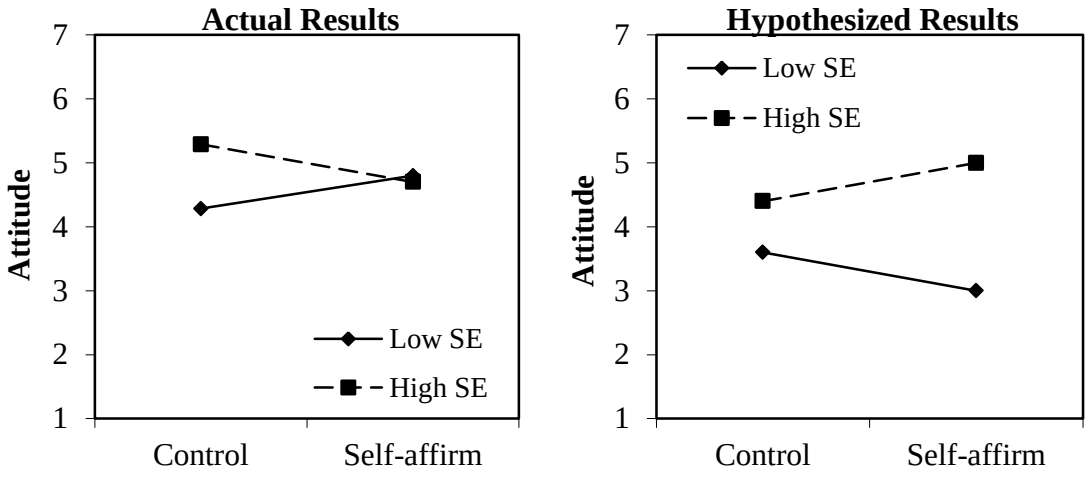


Figure 2.5 Self-affirmation x self-esteem effect on attitude in the high threat message condition

Left: Predicted values for attitude towards daily sunscreen use among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for attitude towards daily sunscreen use among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention

Low Threat Condition. As expected, no interaction effects were found on intention measures. There was no main effect of self-affirmation, either (See *Table 2.6* for regression analyses results). However, there was a main effect of self-esteem on daily sunscreen use intention ***in next three months***, $\Delta R^2_{\text{Step 2}} = .085$, $b = .527$, $t(47) = 2.32$, $p = .025$ (See *Table 2.11* for regression analysis results). This means that participants with HSE expressed higher intentions to use sunscreen daily in next three months than participants with LSE, regardless of whether they were self-affirmed or not.

High Threat Condition. Regression analysis demonstrated no interaction between self-affirmation and self-esteem on intentions to use sunscreen daily, $\Delta R^2 = .012$, $b = -.417$, $t(53) = -1.21$, $p = .23$ (See *Table 2.12* for regression analysis results). Interestingly, there was an interaction between self-affirmation and self-esteem on intention to use sunscreen daily ***in the following week***, $\Delta R^2 = .055$, $b = -.801$, $t(53) = -2.47$, $p = .017$, and on intention to use sunscreen daily ***in the following month***, $\Delta R^2 = .028$, $b = -.647$, $t(53) = -1.72$, $p = .092$, but it disappeared when the timeframe of daily

sunscreen use was changed to ***next three months***, ΔR^2 = .008, *b* = -.336, *t*(53) = -.83, *p* = .409 (See *Table 2.12* for regression analyses results).

Regarding the self-affirmation x self-esteem interaction on daily sunscreen use intention ***in the following week***, simple slope analyses showed that among participants with HSE (-1SD), self-affirmation had a negative effect on intention, *b* = -1.090, *t*(53) = -2.24, *p* = .029. Although the slope for participants with LSE (-1SD) was not statistically significantly different from zero, *b* = .613, *t*(53) = 1.27, *p* = .208, it was sufficiently higher than the slope for participants with HSE (*Z* = 2.49, *p* = .006, one tailed).

Contrary to the hypothesis, self-affirmed participants with LSE showed higher intention to use sunscreen daily in the following week compared to their unaffirmed counterparts, while self-affirmed people with HSE showed lower intention to use sunscreen daily in the following week compared to their unaffirmed counterparts (See *Figure 2.6*).

Regarding the self-affirmation x self-esteem interaction on daily sunscreen use intention ***in the following month***, simple slope analyses showed that the slopes of self-affirmation among participants with HSE (-1SD) and LSE (-1SD) were not statistically different from zero (HSE: *b* = -.750, *t*(53) = -1.33, *p* = .190; LSE: *b* = -.626, *t*(53) = -1.11, *p* = .270). However, the slope for participants with LSE was sufficiently higher than the slope for participants with HSE (*Z* = 1.73, *p* = .042, one tailed).

Contrary to the hypothesis, self-affirmed participants with LSE showed higher intention to use sunscreen daily in the following week compared to their unaffirmed

counterparts, while self-affirmed people with HSE showed lower intention to use sunscreen daily in the following month compared to their unaffirmed counterparts (See *Figure 2.6*).

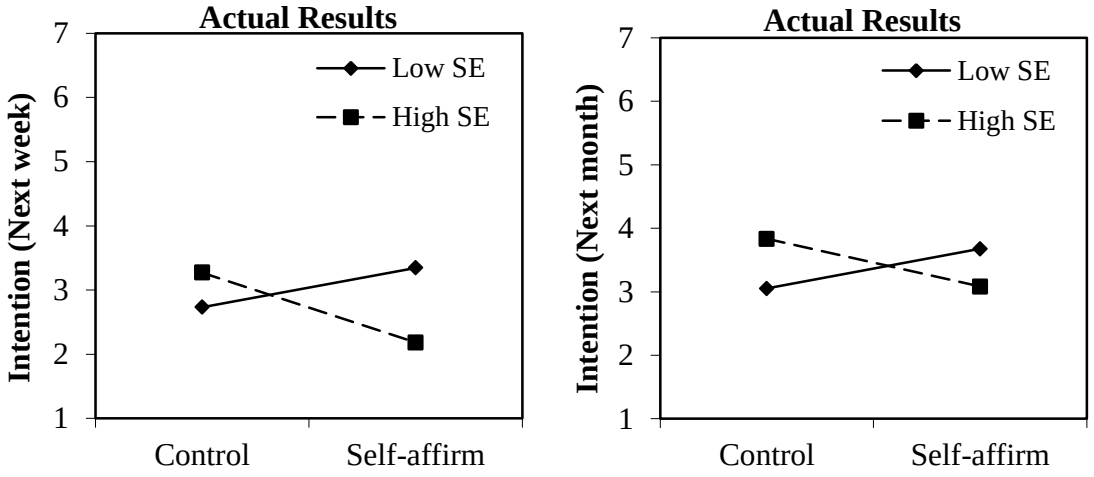
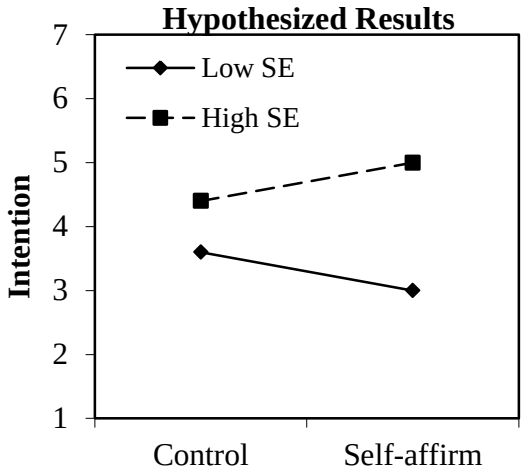


Figure 2.6 Self-affirmation x self-esteem effect on intention in the high threat message condition

Left: Predicted values for intention to use sunscreen daily in the following week among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Predicted values for intention to use sunscreen daily in the following month among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)



Hypothesized results for intention to use sunscreen daily among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE) in the high threat message condition

Table 2.11 Regression Analyses with Attitude and Intention Measures as Dependent Variables in the Low Threat Condition

	Attitude		Intention		Intention (Next Week)		Intention (Next Month)		Intention (Next 3 Mo)	
n = 53	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	4.92***	.24	3.70***	.44	3.31***	.46	3.41***	.47	4.16***	.46
Curr. Sunscreen Use	.29	.25	.31	.45	-.03	.48	.77	.49	.45	.47
Gender	.48**	.16	1.17***	.29	1.09**	.31	.85*	.32	.85**	.31
Self-esteem	.05	.12	.34	.22	-.11	.23	.32	.24	.53*	.23
Self-affirmation	-.45†	.24	.32	.43	.24	.45	.48	.46	.27	.45
R^2 (Step 2 ΔR^2)	.310 (.064)		.322 (.038)		.231 (.010)		.242 (.039)		.254 (.085)	
(Constant)	5.03***	.26	3.70***	.46	3.30***	.49	3.32***	.50	3.14***	.52
Curr. Sunscreen Use	.20	.26	.31	.48	-.03	.51	.85	.52	1.11*	.54
Gender	.48**	.16	1.17***	.30	1.09**	.31	.85*	.32	1.36**	.29
Self-esteem	-.10	.16	.34	.30	-.11	.32	.44	.32	.18	.31
Self-affirmation	-.48*	.24	.32	.43	.24	.46	.50	.47	.20	.42
Esteem x Affirm	.35	.26	-.01	.47	-.01	.50	-.29	.51	-.34	.40
R^2 (Step 3 ΔR^2)	.337 (.027)		.322 (.000)		.231 (.000)		.247 (.005)		.264 (.010)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Curr. Sunscreen Use refers to Current Sunscreen Use Behavior.

Table 2.12 Regression Analyses with Attitude and Intention Measures as Dependent Variables in the High Threat Condition

	Attitude		Intention		Intention (Next Week)		Intention (Next Month)		Intention (Next 3 Mo)	
n = 59	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	4.74***	.27	3.53***	.44	2.93***	.43	3.38***	.49	3.11***	.51
Curr. Sunscreen Use	.13	.28	.11	.47	.46	.46	.70	.52	1.12*	.54
Gender	.55**	.15	1.61***	.25	1.49***	.25	1.55***	.28	1.36***	.29
Self-esteem	.19	.11	.26	.19	-.19	.18	.01	.21	-.00	.22
Self-affirmation	-.03	.22	.08	.36	-.23	.36	-.06	.40	.20	.42
R^2 (Step 2 ΔR^2)	.328 (.033)		.547 (.018)		.463 (.017)		.461 (.000)		.419 (.002)	
(Constant)	4.79***	.26	3.57***	.44	3.31***	.42	3.45***	.48	3.14***	.52
Curr. Sunscreen Use	.12	.27	.10	.46	.44	.44	.68	.51	1.11*	.54
Gender	.55***	.15	1.62***	.25	1.50***	.24	1.55***	.27	1.36***	.29
Self-esteem	.47**	.16	.49	.27	.25	.25	.37	.29	.18	.31
Self-affirmation	-.04	.21	.07	.36	-.24	.34	-.07	.40	.20	.42
Esteem x Affirm	-.52*	.20	-.42	.34	-.80*	.33	-.65†	.38	-.34	.40
R^2 (Step 3 ΔR^2)	.404 (.076)		.559 (.012)		.519 (.055)		.489 (.028)		.426 (.008)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Curr. Sunscreen Use refers to Current Sunscreen Use Behavior.

Supplementary Analyses

I hypothesized that self-affirmation will decrease defensiveness toward the message and increase attitude and intention toward the recommended behavior among people with HSE, and that it would increase defensiveness toward the message and decrease attitude and intention toward the recommended behavior among people with LSE. However, the results showed that whereas self-affirmation decreased psychological discomfort among people with HSE, it also decreased their attitude and intention toward sunscreen use. Among people with LSE, self-affirmation increased psychological discomfort but also increased their attitude and intention toward sunscreen use. It is puzzling yet interesting that the pattern of results on psychological discomfort did not reverse on attitude and intention, as defensiveness towards the message should be negatively associated with attitude and intention toward the recommended behavior in the message. How do we decipher the seemingly contradictory patterns of results on psychological discomfort and on attitude and intention? A possible explanation is that the psychological discomfort I measured does not indicate defensiveness toward the message; therefore the pattern of results on psychological discomfort would be consistent with that on attitude and intention. In the following sections, I will evaluate the plausibility of this explanation.

When Does Psychological Discomfort Indicate Defensiveness?

Conceptually, psychological discomfort is the proximate outcome when one's sense of self-integrity is threatened. It is triggered by the threat's undesirable implication on the self and it in turn drives the implementation of a strategy that reduces this discomfort (Elliot & Devine, 1994). The logic behind using psychological discomfort as a proxy for defensiveness is that when an alternative strategy (e.g., self-affirmation) is not available to reduce the discomfort, the individual will resort to reduce perceived threat through defensive processing. Therefore, the level of psychological discomfort should reflect the level of defensiveness.

However, a potential methodological issue here is that the psychological discomfort I measured right after message exposure may not have captured the psychological discomfort that drove defensive processing. The stem of the psychological discomfort measure was phrased as "Please indicate how you are feeling right now," therefore it measured the psychological state that was present *after* message exposure rather than the one present *during* message exposure. Because discomfort will reduce once a strategy (e.g., defensive processing) to reduce discomfort is implemented, if defensive processing took place during message exposure rather than after message exposure, the levels of psychological discomfort I measured after message exposure would not reflect the levels of discomfort that drove defensiveness.

This scenario is plausible because exposure to a health message can initiate defensive processing while the person is reading the message and change how the

message is processed. Message cues that signal a threat to the self can activate the aversive motivational system which is responsible for motivating protection and withdrawal behaviors (e.g., Bradley, 1994), and change the allocation of cognitive resources in a way that favors the elimination of the perceived threat to the self rather than the intake of beneficial health information (Lang, 2000, 2006). In fact, defensive processing may even prevent health risk information from being fully encoded (e.g., avoidance of attention; Blumberg, 2000). If this is the case, there would not be much difference in the levels of psychological discomfort between the self-affirmation and control conditions because self-affirmed participants would experience low levels of discomfort while unaffirmed participants may reduce discomfort through defensive processing. Indeed, there was no difference between the self-affirmation and control conditions in the levels of psychological discomfort ($M_{\text{Affirm}} = 2.82$, $SD_{\text{Affirm}} = 1.42$, $M_{\text{Ctrl}} = 2.76$, $SD_{\text{Ctrl}} = 1.43$, $t(57) = .156$, $p = .876$).

Interestingly, the Elliot and Devine (1994) study from which I adopted the psychological discomfort measure used the exact same phrase “Please indicate how you are feeling right now” as the stem for the measure, and demonstrated differences in discomfort levels between dissonance-experiencing participants who were given an alternative strategy to reduce discomfort (e.g., an opportunity to change their attitudes) and those who were not. So, why did the same measure work in their study but not in mine? The reason may lie in the difference in the threats to the self between the two studies. My study induced threat to the self through a personally relevant health message

while Elliot and Devine (1994) induced threat to the self by leading participants to write a counter-attitudinal essay out of their free will. With the same threat to the self manipulation as Elliot and Devine (1994), Critcher, Dunning, and Armor (2010) demonstrated that defensive processing of this type of threat to the self did not start until participants were presented with the defensiveness measure itself.

Therefore, it is plausible that Elliot and Devine (1994) captured defensiveness using the psychological discomfort measure because defensive processing just started when participants were presented with the measure, whereas in my study, defensive processing might have already taken place before participants were presented with the measure, rendering the measure ineffective in capturing defensiveness.

Willingness to Acknowledge Experiencing Threat?

If the levels of psychological discomfort I measured do not reflect the levels of psychological discomfort that drove defensiveness, then what did I measure with the psychological discomfort measure, and how can we understand the self-esteem x self-affirmation effect on "psychological discomfort"? I speculate that the psychological discomfort I measured may have reflected the opposite of defensiveness: willingness to acknowledge experiencing a threat to the self. It is likely that those who expressed higher levels of discomfort (e.g., feeling uncomfortable, uneasy, bothered) after message exposure recognized the negative health impacts of their current behavior (e.g., "I'm feeling uncomfortable, uneasy, and bothered because I realized that sun overexposure is bad for my health and I have not done enough to protect myself from it."). If this is the

case, we should expect psychological discomfort be positively correlated with the self-directed negative emotions ("I feel disappointed with myself," "I feel annoyed with myself," and "I feel guilty") and the self-esteem x self-affirmation effect observed on psychological discomfort should be seen on negative self-directed emotions as well.

Indeed, there was a strong positive correlation between psychological discomfort and self-directed negative emotions (r = .621, p = .000). Further supporting my speculation, in the high threat condition, a regression analysis with mean centered self-esteem and dummy-coded self-affirmation at step 1 and self-esteem x self-affirmation interaction term at step 2 demonstrated an interaction between self-esteem and self-affirmation on self-directed negative emotions, ΔR^2 = .068, b = -.659, t(55) = -2.16, p = .035. Simple slope analyses showed that, similar to what was observed on psychological discomfort, among participants with LSE (-1SD), self-affirmation had a positive effect on self-directed negative emotions, b = .910, t(55) = 2.00, p = .050. Although the slope for participants with HSE (+1SD) was not statistically significantly different from zero, b = -.491, t(55) = -1.08, p = .286, it was sufficiently lower than the slope for participants with LSE (Z = -2.18, p = .015, one tailed). Compared to their unaffirmed counterparts, self-affirmed participants with LSE (-1SD) showed higher self-directed negative emotions, while self-affirmed people with HSE (+1SD) showed lower self-directed negative emotions (See *Figure 2.7*).

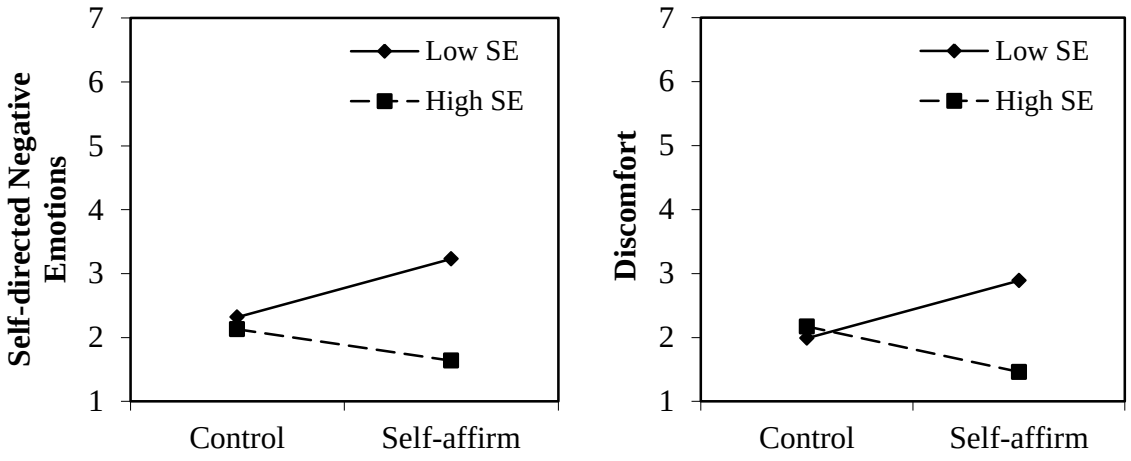


Figure 2.7 Self-affirmation x self-esteem effect on self-directed negative emotions in the high threat message condition

Predicted values for self-directed negative emotions (Left) and psychological discomfort (Right) among self-affirmed and unaffirmed participants with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE) in the high threat message condition

Taken together, it is reasonable to suggest that the levels of psychological discomfort I measured did not accurately reflect the levels of defensiveness; rather, they may have reflected individuals' willingness to acknowledge experiencing a threat to the self. In this case, the self-esteem x self-affirmation effect can be understood, such that self-affirmation increased the willingness to acknowledge experiencing threat and self-directed negative emotions among people with LSE, but reduced that willingness among people with HSE. This is consistent with the *Self-esteem as Resource: Self-affirmation Enlarges Disparities* proposition because self-affirmation likely reminded people with LSE of their relatively low positive self-knowledge and hence made them feeling even

more insecure after health message exposure. In contrast, it reminded people with HSE of their relatively high positive self-knowledge and hence made them feeling better about themselves after health message exposure.

If this is the case, then the pattern of self-esteem x self-affirmation effects on attitude and intention is in fact theoretically in accord with that on "psychological discomfort" and self-directed negative emotions. For participants with LSE, who initially had relatively low attitude and intention toward sunscreen use, self-affirmation may have made them feel worse about themselves after health message exposure and thus motivated them to engage in behavior change (e.g., increased attitude and intention toward sunscreen use). On the contrary, for participants with HSE, who initially had relatively high attitude and intention toward sunscreen use, self-affirmation may have made them feel better about themselves after message exposure and thus reduced their motivation to engage in behavior change (e.g., decreased attitude and intention toward sunscreen use).

Discussion

It was hypothesized that self-affirmation enlarges the disparities between people with HSE and LSE when a high threat health message is processed. I expected that self-affirmation decreases defensiveness to the high threat health message (and increase message acceptance, attitude, and intention to use sunscreen daily) among participants with HSE, but increases defensiveness to the high threat health message (and decrease

message acceptance, attitude, and intention to use sunscreen daily) among participants with LSE.

Partially confirming the hypothesis, the results showed that in the high threat condition, self-affirmation increased psychological discomfort among participants with LSE but decreased it among participants with HSE. There was no interaction between self-esteem and self-affirmation on the rest of the defensiveness indicators or on any of the message acceptance indicators. Surprisingly, contrary to the hypothesis, self-affirmation increased attitude and intention to use sunscreen daily in the following week among participants with LSE but decreased attitude and intention to use sunscreen daily in the following week among participants with HSE (See *Table 2.13*).

However, because the psychological discomfort measure assessed the psychological state after message exposure rather than during the message exposure, it may have not accurately reflected defensiveness. Rather, it may have reflected participants' willingness to acknowledge experiencing threat.

Table 2.13 Summary of Study 1 Findings

Hypotheses	Results	
· Self-affirmation ***decreases*** defensiveness among people with **HSE** but ***increases*** it among people with **LSE**	Partially supported	· High threat: Self-affirmation ***decreased*** psychological discomfort among people with **HSE** but ***increased*** it among people with **LSE** · High threat: Self-affirmation ***increased*** anger regardless of self-esteem levels; People with **HSE** showed ***higher*** anger than people with **LSE**, regardless of self-

		affirmation
· Self-affirmation ***increases*** message acceptance among people with **HSE** but ***decreases*** it among people with **LSE**	Not supported	· ***No change*** on message acceptance indicators
· Self-affirmation ***increases*** attitude and intention among people with **HSE** but ***decreases*** them among people with **LSE**	Not supported (Contradicted)	· Low threat: Self-affirmation ***decreased*** attitude regardless of self-esteem levels; People with **HSE** showed ***higher*** daily sunscreen use intention than people with **LSE** regardless of self-affirmation · High threat: Self-affirmation ***decreased*** attitude and intention among people with **HSE** but ***increased*** it among people with **LSE**

In conclusion, Study 1 showed that self-affirmation increased psychological discomfort, self-directed negative emotions, attitude, and intention among participants with LSE, but decreased psychological discomfort, self-directed negative emotions, attitude, and intention among participants with HSE. If high levels of psychological discomfort in this study reflected higher willingness to acknowledge experiencing a threat to the self rather than higher defensiveness, the findings suggest that, for people with LSE, although self-affirmation may make them feeling worse about themselves, these people may be more likely to engage in behavior change as a result of self-affirmation. However, for people with HSE, although self-affirmation may make them feeling better about themselves, these people may be less motivated to engage in behavior change as a result of self-affirmation.

CHAPTER 3: STUDY 2 – ADEQUACY OF THE AFFIRMED SELF

Abstract

The present study tested whether the adequacy of the affirmed self achieved through self-affirmation manipulation determines when self-affirmation benefits people with HSE versus LSE. It was expected that affirming a value less important than the aspect of self threatened by a message increases defensive processing among people with LSE but not HSE, while affirming a value more important than the aspect of self threatened by a message reduces defensive processing among people with LSE but not HSE. In addition, affirming a wide range of values is expected to decrease defensive processing for people with HSE but increase defensive processing among people with LSE.

Data on flossing from 294 U.S. adults showed that affirming one cherished value, regardless of its self-importance in relation to the aspect of self being threatened in the message, did not produce differential self-affirmation effects for people with HSE and LSE. Affirming a wide range of values, however, increased perceived manipulation among people with LSE but not HSE. This effect did not carry over to message acceptance, attitude, or intention. In fact, affirming a wide range of values reduced daily flossing intention among people with HSE, but not among people with LSE.

Introduction

The adequacy of people's sense of the self achieved through the self-affirmation manipulation may further determine when self-affirmation benefits people with HSE versus LSE. I propose that the type of self-affirmation manipulation may determine the extent to which a person's sense of self-integrity is secured (i.e., the adequacy of the affirmed self) and hence determine how people with HSE and LSE would benefit from self-affirmation.

Writing an essay about a cherished value (e.g., essay affirmation manipulation) directs one's attention to a specific aspect of the self and brings to mind relevant life scenarios and memories. However, going through a wide range of values (e.g., scale affirmation manipulation) or reflect on one's global self-evaluation draws one's attention to a wide variety of aspects of the self. This may bring to mind not only the proudest moments in life but also the unsatisfactory ones.

For people with LSE, who usually think they perform poorly in most aspects of their lives, unsatisfactory moments may be much more frequent and salient in their lives than the proud ones. Therefore, reflecting on a wide range of values may not be able to secure a sense of self-integrity for people with LSE, but may make them aware of the unsatisfactory moments in life and thus leading to increased defensiveness. On the contrary, reflecting on one specific cherished value may be able to secure the sense of self-integrity for people with LSE because it temporarily directs people's attention to their proudest memories only. However, when essay affirmation can achieve an adequate

sense of self for people with LSE may be determined by the self-importance of the affirmed value in relation to the importance of the aspect of self threatened. If the value affirmed is more self-important than the aspect of self being threatened, completing the self-affirmation task can achieve an adequate sense of self for people with LSE and thus buffer the threat from the message and leading to lower defensiveness. However, if the value affirmed is less self-important than the aspect of self being threatened, just like affirming a wide range of values, completing the self-affirmation task cannot achieve an adequate sense of self for people with LSE, and thus may increase defensiveness.

For people with HSE, who usually think they perform well in most aspects of their lives, proud moments may be much more frequent and salient in their lives than the unsatisfactory ones. Therefore, reflecting on a wide range of values will secure a sense of self-integrity for people with HSE and thus leading to decreased defensiveness. However, reflecting on one specific cherished value only makes salient one positive aspect of self. For people with HSE, this may not add much extra goodness to their existing positive self-evaluations but will not bring down their self-evaluations either. Therefore, it is expected that for people with HSE, affirming one cherished value, regardless of its self-importance in relation to that of the aspect of self threatened, will not result in much change in terms of defensiveness, compared with their unaffirmed counterparts.

In conclusion, affirming a value more important than the one threatened may bring people with LSE in line with people with HSE by achieving an adequate sense of self for people with LSE. On the contrary, reflecting on a range of values or on one's

global self-evaluation enlarges the disparities between people with HSE and LSE as it boosts the self-regards of people with HSE but reminds people with LSE that their proud moments are scarce. Specifically, it is hypothesized that affirming a value that is *less* important than the aspect of self threatened increases defensiveness towards the health message and decreases message acceptance, attitude, and intention among people with LSE, but not among people with HSE. In addition, affirming a value that is *more* important than the aspect of self that is threatened in the message decreases defensiveness towards the health message and increases message acceptance, attitude, and intention among people with LSE, but not among people with HSE. Last, affirming a wide range of values increases defensiveness toward the health message and decreases message acceptance, attitude, and intention among people with LSE, but decreases defensiveness and increases message acceptance, attitude, and intention among people with HSE (See *Figure 3.1*).

I chose daily flossing as the behavior for this study, because flossing is more universally relevant compared to the sunscreen use behavior in Study 1. Flossing behavior is less likely to be influenced by environmental factors that people have no control over (e.g., the need to use sunscreen is influenced by UV radiation amount) and have fewer behavioral substitutes than sunscreen use (e.g., sunscreen use can be substituted by protective clothing, shade, etc.).

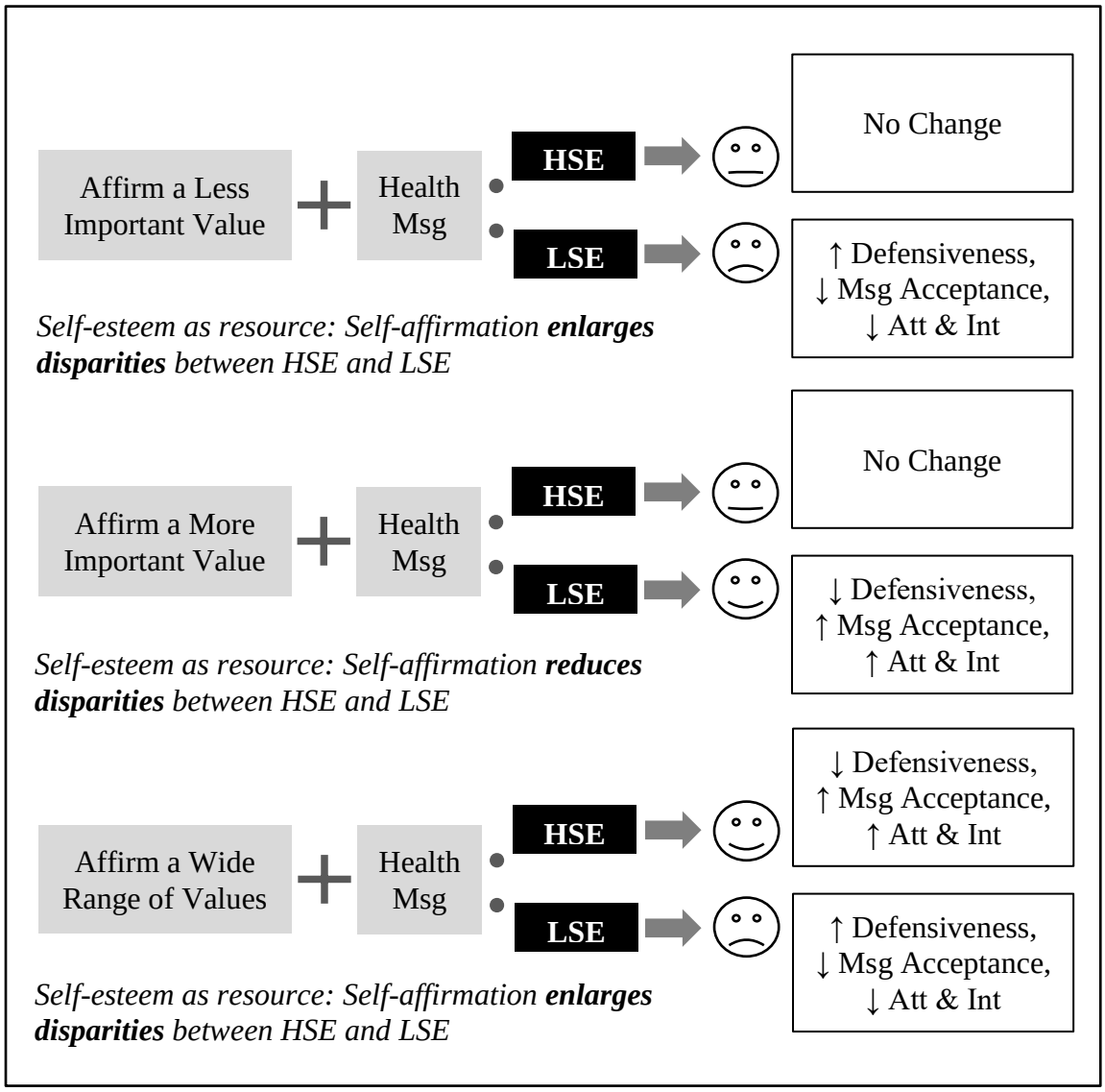


Figure 3.1 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior

Method

Participants

In Study 2, I recruited a U.S. adult sample from the Amazon Mechanical Turk (MTurk) panel. An MTurk sample consists of people who join the MTurk platform to perform human intelligence tasks (e.g., transcribing handwriting, classifying pictures) in exchange for monetary incentives. To conduct a study using an MTurk sample, the researcher needs to create a Requester account on MTurk, post a Human Intelligence Task (HIT) that describes the study and the compensation to be paid, and then allow workers to accept the HIT and complete the study. The researcher can set eligibility requirements so that only workers who meet the requirements can participate.

My major reason for choosing a MTurk sample instead of a college student sample is because a MTurk sample is more heterogeneous in terms of age, racial background, education level, and socioeconomic status, and is more representative of the U.S. population (e.g., Berinsky, Huber, & Lenz, 2012; Buhrmester, Kwang, & Gosling, 2011; Goodman, Cryder, & Cheema, 2013), compared to a college student sample. College students are a homogenous and unusual population. They are WEIRD (i.e., Westernized, Educated, Industrialized, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010) and have good health status in general. College students may hold health beliefs and behaviors that are very different from other adults in the general population (e.g., less concerned about health risks than older adults). Therefore, a college student sample may yield treatment effects different from what would be observed in the

general population. The goal of the present research is to uncover psychological mechanisms underlying people's responses to health messages and to inform the development of public health interventions. Therefore, it is important to use a sample that consists of people that would be the intended audiences of such public health interventions.

A sample of 422 U.S. adults was recruited from the MTurk to participate in Study 2. A total of 294 participants completed both a pre-study questionnaire and the main study two weeks after (retention rate: 70.4%). The ages of participants ranged from 18 to 75 years with an average age of 39.07 (Median = 34; *SD* = 14.18), and 59.5% of participants were female (*n* = 175). A total of 79.9% of participants were White (*n* = 235), 7.5% were Black (*n* = 22), 4.8% were Hispanic or Latino (*n* = 14), 4.4% were Asian (*n* = 13), and 3.4% were multiracial or other (*n* = 10) (See *Appendix A.2* for sample characteristics).

Design and Procedure

A 4 (Self-affirmation task: essay affirmation 1, essay affirmation 2, scale affirmation, no affirmation) by 2 (Autonomy threat: low, high) between-subjects factorial experiment was conducted online. Participants were randomly assigned to one of the eight conditions. Two weeks before the main study, all participants completed a pre-study questionnaire that included the Rosenberg Self-esteem (1965) scale, measures of spontaneous self-affirmation tendency, flossing behavior history, and demographics information.

The essay affirmation 1 and essay affirmation 2 conditions both used an essay task, but differed in whether the value that participants affirmed was more or less important than the value of autonomy. Specifically, in the essay affirmation 1 condition the values listed for people to choose from were less important than autonomy, and in the essay affirmation 2 condition, the values listed for people to choose from were equally or more important than autonomy. The relative importance of the values provided in the essay affirmation conditions was determined two weeks before the study when participants ranked the perceived importance of 18 human values from the Rokeach Value Survey (Rokeach, 1973). To clarify their meaning, each value was followed by a bracket containing two synonyms or brief descriptions (e.g., "Capable [competent, effective]", "Independent [free from outside control, autonomous]"). During the main study two weeks later, participants in the essay affirmation 1 condition were presented with a list of those values they had ranked as less important than "Independent (autonomous)" and participants in the essay affirmation 2 condition were presented with a list of those values they had ranked as equally or more important than "Independent (autonomous)." In both essay affirmation conditions, participants were asked to rank the presented values in terms of their importance and write a short essay about the value that they ranked as the most important. As in study 1, participants were instructed to write about why the particular value was important to them, and how they had used it in life (Harris & Napper, 2005).

In the scale self-affirmation condition, participants completed the self-affirmation scale that was developed by Napper, Harris, and Epton (2009) using statements from the Values in Action Strengths scale (Peterson & Seligman, 2004). Participants were asked to indicate to what extent each of 32 statements described them (e.g., "My friends value my good judgment," "I must stand up for what I believe in, even in the face of strong opposition"). The questionnaire was designed to focus people's minds on their important values rather than assess the strength of the values the statements represent. Last, the no affirmation condition served as a control condition. In this control condition participants were asked to write about the shops and buildings they saw on a route that they traveled regularly (Napper, Harris, & Epton, 2009).

After finishing the assigned self-affirmation task or the control task, participants read one of two messages recommending daily flossing that varied in terms of the level of threat to autonomy (i.e., the presence of forceful vs. polite language). Last, participants filled out a questionnaire that included measures of key variables of interest.

Stimuli

To develop stimuli for study 2, information from the Center for Disease Control and Prevention (CDC) was used to create content for two messages about daily flossing. The messages were comprised of a brief introduction, a middle section, and a conclusion. The middle section described the benefits of daily flossing, the harmful consequences of poor oral health, and statistics on gum disease prevalence in the U.S. The conclusion section summarized the benefits of flossing and recommended flossing daily. Aesthetic

elements were added to make the messages look like real health messages that people may see in the media environment.

Similar to study 1, autonomy threat in the messages was manipulated by using controlling language to recommend daily flossing, or, alternatively, using polite, non-coercive language. The high autonomy threat message contained controlling terms such as ‘‘should’’ and ‘‘have to’’ and included phrases such as “You have to admit that,” “You simply have to do it,” and “You do not have a choice.” The low autonomy threat message contained non-coercive terms such as “may’’ and “would” and included autonomy-supportive phrases such as “It would be a good idea,” “The choice is yours,” and “Now might be a good time to give it a try.”

A pilot test was conducted to examine whether the messages can successfully manipulate perceived autonomy threat. A total of 53 U.S. adults recruited from the Amazon Mechanical Turk panel were randomly assigned to two message conditions. A total of 24 participants read the high autonomy threat message and 29 participants read the low autonomy threat message. After reading the messages, participants answered manipulation check questions that assessed their perceptions of autonomy threat.

As in study 1, the **perceived autonomy threat manipulation check** comprised of eight 7-point items based on Dillard and Shen (2005), with four items adapted from the original Dillard and Shen measure (e.g., “The message tried to make a decision for me”) and four items created specifically for the flossing behavior (e.g., “The message tried to restrict my freedom over flossing”; $\alpha = .906$). The result showed that the manipulation

was successful. The high threat message induced higher levels of perceived autonomy threat (M = 4.47, SD = 1.59) than the low threat message (M = 2.82, SD = .1.11), d = 1.20, $t(40)$ = -4.29, p = .000.

The pilot-tested messages were used in study 2 as stimuli. Participants assigned to the high autonomy threat condition read the message that contained controlling language and participants assigned to the low autonomy threat message read the message that contained non-coercive, polite language. Participants completed the perceived autonomy threat manipulation check after they finished reading the message (See *Figure 3.2* and *Figure 3.3* for the messages).

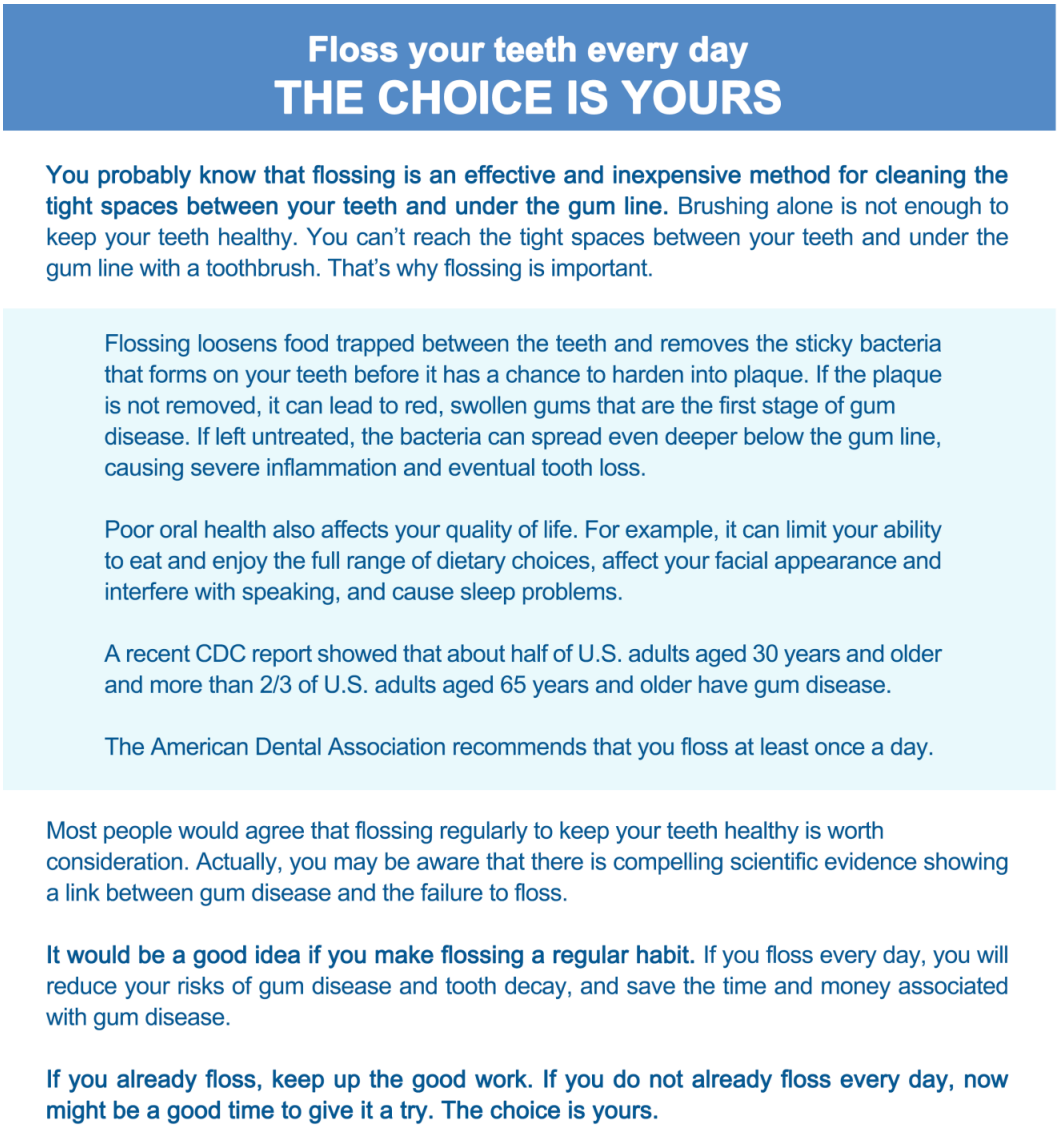


Figure 3.2 Low autonomy threat flossing message

Figure 3.3 High autonomy threat flossing message

Key Measures

Self-esteem was measured with the Rosenberg self-esteem scale (1965). Participants responded to ten 7-point scale items, such as "On the whole, I am satisfied with myself," "I feel that I'm a person of worth, at least on an equal plane with others," and "I wish I could have more respect for myself" (1 = "Strongly disagree" – 7 = "Strongly agree"). Five items were reverse scored. Participants' average scores of the ten items were used as the indicator of self-esteem ($\alpha = .938$; $M = 5.34$, $SD = 1.28$).

Indicators of Defensive Processing

Because Study 2 was conducted before data analysis of Study 1 had been concluded, the same **Psychological Discomfort** measure was used in Study 2. As discussed in Study 1, measuring psychological discomfort after message exposure may not capture the psychological state that drove defensive processing but may reflect people's willingness to acknowledge experiencing threat to the self. Therefore, we should be open to the possibility that psychological discomfort data may reflect the opposite of defensiveness: willingness to acknowledge experiencing threat. For consistency purposes, I will continue to label this measure as "psychological discomfort."

Same as in Study 1, psychological discomfort was measured with three 7-point scale items adapted from Elliot and Devine (1994). "I feel uncomfortable," "I feel uneasy," and "I feel bothered" followed the stem "Please indicate how you are feeling right now" (1 = "None of this feeling" – 7 = "A great deal of this feeling"). The mean of

the three items was used as the composite score for psychological discomfort (α = .89; *M* = 2.18, *SD* = 1.43).

Anger was measured with three 7-point scale items "I feel annoyed," "I feel irritated," and "I feel angry" (*M* = 1.92, *SD* = 1.24). To reduce experimental demand concerns, I included additional items to measure self-directed negative emotions ("I feel disappointed with myself," "I feel annoyed with myself," and "I feel guilty"; *α* = .920; *M* = 2.47, *SD* = 1.68) and self-directed positive emotions ("I feel confident" and "I feel good about myself"; *r* = .772; *M* = 4.48, *SD* = 1.68).

Message skepticism was measured with the 7-point scale item "While reading the message, I was skeptical of what was being said" (1 = "Strongly disagree" – 7 = "Strongly agree"; *M* = 2.56, *SD* = 1.57).

Given that the affective response measures (e.g., psychological discomfort and anger) are prone to floor effects and thus may not sufficiently capture defensiveness, two validated measures of defensive responses to message stimuli (Witte, 1991, 1994), i.e., message derogation and perceived manipulation, were added to provide more information on defensiveness and to triangulate the results obtained from the former three measures. Message derogation has been used in previous self-affirmation research to measure defensiveness to health messages as well (e.g., Jessop, Simmonds, & Sparks, 2009; van Koningsbruggen & Das, 2009).

Message derogation was measured with four 7-point scale items: "The information in the message was exaggerated," "The information in the message was distorted," "The information in the message was overstated," and "The information in the message was overblown" (1 = "Strongly disagree" – 7 = "Strongly agree"). The mean of the four items was used as the composite score for message derogation (α = .948, *M* = 2.75, *SD* = 1.48).

Perceived manipulation was measured with three 7-point scale items: "The message made me feel manipulated," "The message made me feel exploited," and "The message deliberately tried to manipulate my feelings" (1 = "Strongly disagree" – 7 = "Strongly agree"). The mean of the three items was used as the composite score for perceived manipulation (α = .887, *M* = 3.07, *SD* = 1.61).

Indicators of Message Acceptance

A 7-item bipolar semantic differential scale (1 – 7) adopted from Yzer et al., (2011) was used to measure message acceptance. The stem phrase "To me, the message was:" was anchored with seven word pairs. The first four items, "extremely unconvincing – extremely convincing," "extremely unbelievable – extremely believable," "extremely forgettable – extremely memorable," and "extremely bad – extremely good," measured **perceived convincingness** (α = .813, *M* = 5.42, *SD* = 1.11). The fifth and sixth items, "extremely unpleasant – extremely pleasant" and "extremely negative – extremely positive" measured **perceived pleasantness** (*r* = .673, *M* = 4.72, *SD* = 1.35). The last

item, “extremely not meant for someone like me – extremely meant for someone like me,” measured **perceived relevance** (*M* = 4.99, *SD* = 1.66).

Daily Flossing Attitude and Intention

Ten 7-point bipolar semantic differential items were used to measure **attitude**: “Flossing my teeth every day is: “unpleasant – pleasant”, “unenjoyable – enjoyable”, “stressful – relaxing”, “frightening – assuring”, “difficult – easy”, “negative – positive”, “bad – good”, “harmful – beneficial”, “foolish – wise” and “unnecessary – necessary.” Participants’ average scores of the ten items were used as the indicator of attitude towards daily flossing (α = .896, *M* = 5.52, *SD* = 0.93).

Four 7-point scale items were used to measure **intention to floss daily**: “How likely is it that you will floss every day? (1 = “Very unlikely” – 7 = “Very likely”)”, “I can see myself flossing every day,” “I will floss every day,” and “I intend to floss every day” (1 = “Strongly disagree” – 7 = “Strongly agree”). The average score of the four items was used as the overall measure of intention (α = .967, *M* = 5.06, *SD* = 1.72).

Three additional intention measures with time frames were used to examine whether people’s intentions to floss daily would differ when a specific temporal context is added. **Intention to floss daily in the following week** was measured by a 7-point scale item – “How likely is it that you will floss every day in the following week?” (1 = “Very unlikely” – 7 = “Very likely”; *M* = 5.04, *SD* = 1.95). **Intention to floss daily in the following month** was measured by a 7-point scale item – “How likely is it that you will floss every day in the following month?” (1 = “Very unlikely” – 7 = “Very likely”; *M* =

4.74, *SD* = 2.05). **Intention to floss daily in next three months** was measured by a 7-point scale item – "How likely is it that you will floss every day in the next three months?" (1 = "Very unlikely" – 7 = "Very likely"; *M* = 4.51, *SD* = 2.17).

Control Variables

Recent work suggests that people may naturally reflect on their values or strengths in the face of a threat and this tendency to spontaneously self-affirm has been associated with outcomes similar to that of experimentally induced self-affirmation (e.g., Emanuel et al., 2016; Ferrer et al., 2015). Two weeks before the main study, participants' **spontaneous self-affirmation tendency** was measured with two 7-point scale items developed by Harris et al. (2011): "When I feel threatened or anxious I find myself thinking about my strengths" and "When I feel threatened or anxious I find myself thinking about what I stand for" (1 = "Strongly disagree" – 7 = "Strongly agree"; *r* = .598, *M* = 4.48, *SD* = 1.42). Despite randomized participant assignment, the distribution of spontaneous self-affirmation tendency varied across the experimental self-affirmation conditions, $F(3, 286) = 3.13$, $p = .026$, $\eta^2 = .031$. To determine whether it was necessary to control spontaneous self-affirmation tendency in the analyses to reduce possible confounding effect, I examined the correlations between spontaneous self-affirmation tendency and the dependent variables within each experimental condition. Because spontaneous self-affirmation tendency was correlated with psychological discomfort, anger, all message acceptance measures, and attitude and intention (See *Table 3.1*), it was included as a control variable in analyses on these dependent variables.

It is conceivable that, regardless of self-affirmation manipulation, people who currently floss daily might report lower defensiveness, higher message acceptance, and more favorable attitude and higher intention regarding flossing because the health message was consistent with their current position on flossing. Therefore, I also included flossing behavior history as a potential control variable. I measured participants' **flossing behavior history** with two questions two weeks before the main study: "How often did you floss last week?" (1 = "Never" – 7 = "Every day") and "How often did you floss last month?" (1 = "Never" – 5 = "Every day"). Responses to the 5-point scale item were converted to 7-point (*Min* = 1, *Max* = 7). The mean of the two items (r = .914, M = 3.87, SD = 2.29) was used as an indicator of flossing history. Because flossing history was moderately correlated with all defensiveness indicators, perceived pleasantness, and attitude and intention (See *Table 3.2*), flossing history was entered as a control variable in analyses on these dependent variables.

Table 3.1 Bivariate Correlations between Spontaneous Self-Affirmation Tendency and Dependent and Independent Variables by Experimental Condition

	Control		Essay Affirm 1		Essay Affirm 2		Scale Affirm	
Threat Level	Low	High	Low	High	Low	High	Low	High
Self-esteem	.42*	.02	.48*	.74*	.31*	.51*	.31†	.08
Discomfort	-.12	.08	.05	-.42*	.18	.08	.14	.17
Anger	.04	.00	.23	-.45**	.17	.16	.24	.32†
Skepticism	.01	.16	.24	.02	.08	-.22	.08	-.02
Derogation	-.05	.23	.21	-.08	-.06	-.19	-.04	.06
Perc. Manipul.	.08	.00	.26	-.23	.11	.06	.04	.09
Perc. Conv.	.01	-.13	-.13	.19	.07	.32*	.26†	-.13

Perc. Plea.	.04	-.05	-.15	.47**	.26	.15	.22	.09
Perc. Relev.	.04	-.02	.07	.09	.27	.39*	.35*	-.09
Attitude	-.26	.07	.08	.51**	.21	-.14	.00	.07
Intention	-.24	-.18	-.14	.69***	-.05	.18	-.16	.02
Int (Nxt Wk)	-.29†	-.17	-.03	.57***	-.02	.18	-.12	.05
Int (Nxt Mo)	-.20	-.16	-.08	.61***	.00	.12	-.12	.21
Int (Nxt 3 Mo)	-.18	-.12	.00	.61***	-.04	.06	-.13	.26

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manipul. refers to perceived manipulation. Perc. Conv. refers to perceived convincingness. Perc. Plea. refers to perceived pleasantness. Perc. Relev. refers to perceived relevance. Int refers to Intention.

Table 3.2 Bivariate Correlations between Current Flossing Behavior and Dependent and Independent Variables by Experimental Condition

	Control		Essay Affirm 1		Essay Affirm 2		Scale Affirm	
Threat Level	Low	High	Low	High	Low	High	Low	High
Self-esteem	.28†	.08	-.00	.56***	.18	.25	.16	-.03
Discomfort	-.52**	-.32*	-.37*	-.36*	-.33*	-.27†	-.11	-.32†
Anger	-.37*	-.23	-.38*	-.37*	-.33*	-.38*	-.10	-.23
Skepticism	-.02	-.33*	-.29	-.16	-.09	-.26	-.21	-.33†
Derogation	-.08	-.26	-.26	-.15	-.09	-.24	-.31*	-.22
Perc. Manipul.	-.12	-.42**	-.39*	-.25	-.25	-.21	-.22	-.16
Perc. Conv.	.12	.07	.26	.21	-.06	-.01	-.03	.09
Perc. Plea.	.20	.22	.37*	.46**	.09	-.01	-.15	-.00
Perc. Relev.	-.12	-.02	.11	.05	-.06	-.05	-.20	-.07
Attitude	.31†	.60***	.45**	.53**	.38*	.50**	.46**	.55**
Intention	.55***	.63***	.62***	.70***	.80***	.77***	.62***	.76***
Int (Nxt Wk)	.54**	.63***	.58***	.68***	.71***	.74***	.65***	.68***
Int (Nxt Mo)	.50**	.66***	.65***	.63***	.75***	.73***	.59***	.74***
Int (Nxt 3 Mo)	.49**	.66***	.59***	.68***	.75***	.73***	.52***	.76***

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manipul. refers to perceived

manipulation. Perc. Conv. refers to perceived convincingness. Perc. Plea. refers to perceived pleasantness. Perc. Relev. refers to perceived relevance. Int refers to Intention.

Results

Preliminary Analysis

The effectiveness of the stimuli in inducing high versus low levels of autonomy threat was confirmed with the perceived autonomy threat manipulation check (α = .926; See p.110 for scale items). The high threat message induced higher levels of perceived autonomy threat (M = 4.32, SD = 1.54) than the low threat message (M = 2.93, SD = 1.17), d = 1.02, $t(292)$ = -8.73, p = .000.

To test whether the self-affirmation manipulation led participants to reflect on aspects of the self that are important and positive, manipulation check questions adopted from Napper, Epton, and Harris (2009) were used. The stem "The task made me think about …" was followed by three 7-point (1 – 7) bipolar semantic differential scale items "negative aspects of myself – Positive aspects of myself," "Things that are not important to me – Things that are important to me," and "Things I don't like about myself – Things I like about myself." The mean score of the three items was used (α = .853, M = 5.33, SD = 1.42).

An ANCOVA analysis with self-affirmation conditions as the independent variable and spontaneous self-affirmation tendency as a covariate showed that participants in the self-affirmation conditions thought the self-affirmation task led them

to think about things that are important and positive about themselves to a greater extent than people in the control condition ($F(3, 289) = 25.73$, $p = .000$, $\eta^2 = .199$). Also, more people in the essay self-affirmation 2 condition reported that they thought about important and positive things about themselves (i.e., percentage of scores greater than midpoint "4") than those in the essay self-affirmation 1 or those in the scale self-affirmation condition (See *Table 3.3*).

Table 3.3 Self-Affirmation Manipulation Check Results

Condition	*n*	*M* (*SE*)	% of scores > midpoint "4"
Essay affirmation 1	68	5.65 (0.15)	85.3
Essay affirmation 2	73	5.95 (0.15)	90.4
Scale affirmation	76	5.51 (0.14)	80.3
Control	77	4.29 (0.14)	55.5

Data Analysis Strategy

It was hypothesized that affirming a value that is less important than the one threatened (i.e., Essay affirmation 1 condition) increases the defensive responses towards the high threat health message, decreases message acceptance, attitude, and intention among people with LSE, but not among people with HSE. To test the hypothesis, the responses of participants with HSE and LSE in the essay affirmation 1 condition were compared with the responses of those in the control condition.

In addition, it was hypothesized that affirming a value that is more important than the one threatened (i.e., Essay affirmation 2 condition) decreases the defensive responses

towards the high threat health message, increases message acceptance, attitude, and intention among people with LSE, but less so or not at all among people with HSE. To test the hypothesis, the responses of participants with HSE and LSE in the essay affirmation 2 condition were compared with the responses of those in the control condition.

Last, it was hypothesized that affirming a wide range of values (i.e., Scale affirmation condition) increases the defensive responses toward the high threat health message, decreases message acceptance, attitude, and intention among people with LSE, but decreases the defensive responses toward the high threat health message, increases message acceptance, attitude, and intention among people with HSE. To test the hypothesis, the responses of participants with HSE and LSE in the scale affirmation condition were compared with the responses of those in the control condition.

A series of hierarchical regression analyses were conducted with indicators of defensiveness, message acceptance, attitude, and intention regarding flossing daily as the dependent variables. Two regression models were built for the low and high threat conditions for each dependent variable. Three dummy-coded condition variables were constructed to represent the self-affirmation conditions (i.e., Essay Affirm 1, Essay Affirm 2, Scale Affirm; See *Table 3.4*). The control condition was used as a reference group and thus was coded as "0" in all three condition variables. Three two-way interaction terms were built by multiplying self-esteem with each condition variable (i.e.,

Self-esteem x Essay Affirm 1, Self-esteem x Essay Affirm 2, and Self-esteem x Scale Affirm).

Table 3.4 Dummy Coded Self-affirmation Condition Variables

	Dummy-coding of condition variables		
Conditions	Essay Affirm 1	Essay Affirm 2	Scale Affirm
Essay affirmation 1	1	0	0
Essay affirmation 2	0	1	0
Scale affirmation	0	0	1
Control	0	0	0

In the regression models for ***psychological discomfort***, ***anger***, ***perceived pleasantness***, ***attitude***, and ***all four intention measures***, I entered the mean-centered current flossing behavior and spontaneous self-affirmation tendency at step 1 as control variables. At step 2, I entered mean-centered self-esteem and the three dummy-coded self-affirmation condition variables. At step 3, I entered the three two-way interaction terms.

In the regression models for ***message skepticism***, ***message derogation***, and ***perceived manipulation***, I entered the mean-centered current flossing behavior at step 1 as a control variable. At step 2, I entered mean-centered self-esteem and the three dummy-coded self-affirmation condition variables. At step 3, I entered the three two-way interaction terms.

In the regression models for ***perceived convincingness*** and ***perceived relevance***, I entered the mean-centered spontaneous self-affirmation tendency at step 1 as a control variable. At step 2, I entered mean-centered self-esteem and the three dummy-coded self-affirmation condition variables. At step 3, I entered the three two-way interaction terms.

The proposed effects would be indicated by interactions between the self-affirmation condition variables and self-esteem in the high threat message condition. An interaction between ***Essay Affirm 1 and self-esteem*** means that the effect of essay affirmation 1 task is different for people with HSE and LSE. Similarly, an interaction between ***Essay Affirm 2 and self-esteem*** means that the effect of essay affirmation 2 task is different for people with HSE and LSE. Last, an interaction between ***Scale Affirm and self-esteem*** means that the effect of scale affirmation task is different for people with HSE and LSE.

Descriptive Statistics

The bivariate correlations and descriptive statistics of dependent and independent variables are reported in *Table 3.5* to *Table 3.10*.

Table 3.5 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in Low Threat Condition

n = 146				Self-esteem: *M* (*SD*) = 5.24 (1.29)	
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Defensiveness***					
	Psy. Discmft	Anger	Msg. Skeptic.	Msg. Derogate.	Perc. Manipul.
Essay Affirm 1	-.05	-.07	-.10	-.08	-.14
Essay Affirm 2	.02	-.03	.23**	.16†	.09
Scale Affirm	.20*	.21*	-.17*	-.08	-.04
Self-esteem	-.32***	-.25**	-.07	-.12	-.07
M (*SD*)	1.98 (1.39)	1.74 (1.14)	2.23 (1.22)	2.30 (1.08)	2.48 (1.28)
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Message Acceptance***					
	Perc. Conv.		Perc. Pleas.		Perc. Relev.
Essay Affirm 1	-.01		.03		.04
Essay Affirm 2	-.17*		-.16†		-.08
Scale Affirm	.19*		.01		.14†
Self-esteem	.04		.15†		-.07
M (*SD*)	5.55 (0.95)		5.11 (1.13)		5.14 (1.53)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skeptic. refers to Message Skepticism. Msg. Derogate. refers to Message Derogation. Perc. Manipul. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance.

Table 3.6 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in Low Threat Condition

n = 146 Self-esteem: *M* (*SD*) = 5.24 (1.29)

Correlations between Self-Affirmation, Self-Esteem, and ***Measures of Attitude and Intention***

	Attitude	Intention	Int. (Nxt wk.)	Int. (Nxt mo.)	Int. (Nxt 3 mo.)
Essay Affirm 1	.16†	.10	.12	.10	.13
Essay Affirm 2	-.13	.01	.01	.01	.00
Scale Affirm	-.03	-.08	-.09	-.05	-.10
Self-esteem	.20*	.13	.13	.10	.12
M (*SD*)	5.62 (0.88)	5.32 (1.65)	5.26 (1.90)	5.05 (1.96)	4.85 (2.09)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Int. refers to Intention.

Table 3.7 Bivariate Correlations between Dependent Variables in Low Threat Condition

n = 146	1	2	3	4	5	6	7	8	9	10	11	12
1. Discomfort	-											
2. Anger	.80***	-										
3. Msg. Skeptic.	.05	.06	-									
4. Msg. Derogate.	.11	.13	.78***	-								
5. Perc. Manipul.	.43***	.38***	.50***	.54***	-							
6. Perc. Conv.	-.03	-.08	-.28**	-.38***	-.25**	-						
7. Perc. Pleas.	-.35***	-.23**	-.10	-.22**	-.47***	.50***	-					
8. Perc. Relev.	.01	-.06	-.13	-.20*	-.12	.78***	.30***	-				
9. Attitude	-.17*	-.15†	-.25**	-.41***	-.38***	.41***	.46***	.25**	-			
10. Intention	-.25**	-.28**	-.03	-.15†	-.26**	.21*	.27**	.06	.64***	-		
11. Int (Nxt wk)	-.18*	-.19*	-.02	-.16†	-.21*	.19*	.22**	.04	.63***	.93***	-	
12. Int (Nxt mo)	-.23**	-.21*	-.04	-.15†	-.26**	.21*	.28**	.03	.58***	.91***	.90***	-
13. Int (Nxt 3 mo)	-.25**	-.21*	-.02	-.14†	-.24**	.17*	.28**	-.03	.58***	.86***	.86***	.95***

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort. refers to Psychological Discomfort. Msg. Skeptic. refers to Message Skepticism. Msg. Derogate. refers to Message Derogation. Perc. Manipul. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int. refers to Intention.

Table 3.8 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in High Threat Condition

n = 148 Self-esteem: *M* (*SD*) = 5.44 (1.27)

Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Defensiveness***					
	Discomfort	Anger	Msg. Skeptic.	Msg. Derogate.	Perc. Manipul.
Essay Affirm 1	-.11	-.08	-.25	-.06	-.06
Essay Affirm 2	.03	.04	.09	.03	.00
Scale Affirm	.12	.07	.20*	.11	.19*
Self-esteem	-.34***	-.30***	-.08	-.04	-.01
M (*SD*)	2.38 (1.45)	2.09 (1.32)	2.89 (1.80)	3.20 (1.68)	3.65 (1.70)

Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Message Acceptance***			
	Perc. Conv.	Perc. Pleas.	Perc. Relev.
Essay Affirm 1	.03	-.02	-.04
Essay Affirm 2	-.03	.05	-.09
Scale Affirm	-.04	-.20*	.10
Self-esteem	.07	.11	-.08
M (*SD*)	5.29 (1.24)	4.34 (1.44)	4.84 (1.76)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skeptic. refers to Message Skepticism. Msg. Derogate. refers to Message Derogation. Perc. Manipul. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance.

Table 3.9 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables in High Threat Condition

n = 148 Self-esteem: *M* (*SD*) = 5.44 (1.27)

Correlations between Self-Affirmation, Self-Esteem, and ***Measures of Attitude and Intention***

	Attitude	Intention	Int. (Nxt wk.)	Int. (Nxt mo.)	Int. (Nxt 3 mo.)
Essay Affirm 1	-.01	.03	.06	.01	.00
Essay Affirm 2	.03	.03	.01	.06	.07
Scale Affirm	-.11	-.12	-.14	-.13	-.07
Self-esteem	.18*	.23**	.19*	.23**	.20*
M (*SD*)	5.43 (0.97)	4.79 (1.75)	4.83 (1.98)	4.43 (2.09)	4.18 (2.20)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Int. refers to Intention.

Table 3.10 Bivariate Correlations between Dependent Variables in High Threat Condition

n = 148	1	2	3	4	5	6	7	8	9	10	11	12
1. Discomfort	-											
2. Anger	.80***	-										
3. Msg. Skeptic.	.33***	.40***	-									
4. Msg. Derogate.	.30***	.42***	.85***	-								
5. Perc. Manipul.	.36***	.44***	.60***	.64***	-							
6. Perc. Conv.	-.06	-.25**	-.59***	-.65***	-.38***	-						
7. Perc. Pleas.	-.21*	-.30***	-.41***	-.50***	-.54***	.64***	-					
8. Perc. Relev.	.05	-.13	-.41***	-.45***	-.23**	.76***	.46***	-				
9. Attitude	-.34***	-.40***	-.40***	-.38***	-.41***	.33***	.41***	.18*	-			
10. Intention	-.34***	-.40***	-.42***	-.38***	-.31***	.24**	.32***	.13	.65***	-		
11. Int (Nxt wk)	-.32***	-.42***	-.42***	-.39***	-.35***	.31***	.34***	.20*	.62***	.91***	-	
12. Int (Nxt mo)	-.32***	-.39***	-.37***	-.34***	-.32***	.26**	.34***	.12	.66***	.91***	.91***	-
13. Int (Nxt 3 mo)	-.27**	-.33***	-.32***	-.30***	-.29***	.22**	.32***	.09	.67***	.87***	.84***	.96***

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Msg. Skeptic. refers to Message Skepticism. Msg. Derogate. refers to Message Derogation. Perc. Manipul. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int. refers to Intention.

Outline of Results

Overall, regression analyses revealed interactions between self-esteem and self-affirmation in the high threat condition on perceived manipulation and intention when the scale affirmation condition was compared to the control condition. No self-affirmation x self-esteem interaction was found when the essay affirmation 1 and essay affirmation 2 conditions were compared to the control condition and no interaction was found when the essay affirmation 1 condition was compared to the essay affirmation 2 condition, either (See *Table 3.11* for results outline).

Given the complexity of the research design, I will present the results in three sections based on the category of the dependent variable, namely, (1) effects on indicators of defensiveness, (1) effects on indicators of message acceptance, and (3) effects on attitude and intention. Next, supplemental analyses will be provided to aid further understanding the findings.

Table 3.11 Outline of Study 2 Results

Dependent Variables		**Interaction Effects**	**Main Effects**
Indicators of Defensiveness	Discomfort	-	Low threat: Scale Aff (+), SE (-); High threat: SE (-)
	Anger	-	Low threat: Scale Aff (+), SE (-); High threat: SE (-)
	Skepticism	-	Low threat: Scale Aff (-)
	Derogation	-	-
	Perc. Manip.	High threat: Scale Aff x SE	Low threat: Essay Aff 1 (-)
Indicators of	Perc. Conv.	-	-

Message Acceptance	Perc. Pleas.	-	High threat: Scale Aff (-)
	Perc. Relev.	-	Low threat: Scale Aff (+)
Attitude and Intention Measures	Attitude	Low threat: Scale Aff x SE, Essay Aff 2 x SE	-
	Intention	High threat: Scale Aff xSE	Low threat: Essay Aff 1 (+)
	Int (Nxt wk)	High threat: Scale Aff x SE	Low threat: Essay Aff 1 (+)
	Int (Nxt mo)	High threat: SE x Scale Aff	Low threat: Essay Aff 1 (+)
	Int (Nxt 3 mo)	High threat: SE x Scale Aff	Low threat: Essay Aff 1 (+)

Note. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manip. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int refers to Intention.

1. Role of Self-Esteem in Self-Affirmation Effects on Defensiveness

Psychological Discomfort

Low Threat Condition. No interaction effect of self-esteem x self-affirmation was found. There was no main effect of self-esteem either. However, there was a main effect of ***Scale Affirm***, $\Delta R^2_{\text{Step 2}} = .129$, $b = .639$, $t(139) = 2.22$, $p = .028$. This means that participants who affirmed a range of values (i.e., Scale affirmation) expressed higher levels of psychological discomfort than participants in other self-affirmation/control conditions, regardless of their self-esteem levels.

Also, there was a main effect of ***self-esteem***, $b = -.364$, $t(139) = -3.97$, $p = .000$. This means that participants with HSE expressed lower levels of psychological

discomfort than participants with LSE regardless of whether they were self-affirmed or not (See *Table 3.12* for regression analysis results).

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-affirmation either. However, there was a main effect of ***self-esteem***, $\Delta R^2_{\text{Step 2}} = .095$, $b = -.363$, $t(141) = -3.87$, $p = .000$ (See *Table 3.13* for regression analysis results). This means that participants with HSE expressed lower levels of psychological discomfort than participants with LSE regardless of whether they were self-affirmed or not.

Anger

Low Threat Condition. No interaction effect of self-esteem x self-affirmation was found. There was no main effect of self-esteem either. However, there was a main effect of ***Scale Affirm***, $\Delta R^2_{\text{Step 2}} = .124$, $b = .491$, $t(139) = 2.06$, $p = .042$. This means that participants who affirmed a range of values (i.e., Scale affirmation) expressed higher levels of anger than participants in other self-affirmation/control conditions, regardless of their self-esteem levels. Also, there was a main effect of ***self-esteem***, $b = -.285$, $t(139) = -3.75$, $p = .000$. This means that participants with HSE expressed lower levels of anger than participants with LSE regardless of whether they were self-affirmed or not (See *Table 3.12* for regression analysis results).

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-affirmation either. However, there was a main effect of ***self-esteem***, $\Delta R^2_{\text{Step 2}} = .076$, $b = -.305$, $t(141) = -$

3.51, p = .001. This means that participants with HSE expressed lower levels of anger than participants with LSE regardless of whether they were self-affirmed or not (See *Table 3.13* for regression analysis results).

Message Skepticism

Low Threat Condition. No interaction effect of self-esteem x self-affirmation was found. There was no main effect of self-esteem either. However, there was a main effect of ***Scale Affirm***, $\Delta R^2_{\text{Step 2}}$ = .081, b = -.538, $t(140)$ = -2.00, p = .048. This means that participants who affirmed a wide range of values (i.e., Scale affirmation) expressed lower levels of message skepticism than unaffirmed participants, regardless of their self-esteem levels (See *Table 3.12* for regression analysis results).

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem or self-affirmation either (See *Table 3.13* for regression analysis results).

Message Derogation

Unexpectedly, no interaction effect of self-esteem x self-affirmation was found in either high or low threat condition. There was no main effect of self-esteem or self-affirmation, either (See *Table 3.12* and *Table 3.13* for regression analysis results).

Perceived manipulation

Low Threat Condition. As expected, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem either. However, there

was a main effect of ***Essay Affirm 1***, $\Delta R^2_{\text{Step 2}} = .035$, $b = -.602$, $t(140) = -1.98$, $p = .049$ (See *Table 3.12* for regression analysis results). This means that participants who affirmed a value less important than "independent (autonomous)" expressed lower levels of perceived manipulation than participants in other self-affirmation/control conditions, regardless of their self-esteem levels.

High Threat Condition. The regression analysis demonstrated an interaction on perceived manipulation between ***Scale Affirm and self-esteem***, $\Delta R^2_{\text{Step 3}} = .047$, $b = -.618$, $t(140) = -1.98$, $p = .049$ (See *Table 3.13* for regression analysis results). Simple slope analysis showed that among participants with LSE (-1SD), affirming a range of values had a positive effect on perceived manipulation, $b = 1.546$, $t(140) = 2.76$, $p = .007$. However, among participants with HSE (+1SD), affirming a range of values had no effect on perceived manipulation, $b = -.028$, $t(140) = -.051$, $p = .959$.

Consistent with the hypothesis, participants with LSE (-1SD) who affirmed a range of values (i.e., Scale affirmation) expressed higher levels of perceived manipulation than their unaffirmed counterparts, while people with HSE (+1SD) who affirmed a range of values showed no change on perceived manipulation compared to their unaffirmed counterparts (See *Figure 3.4*).

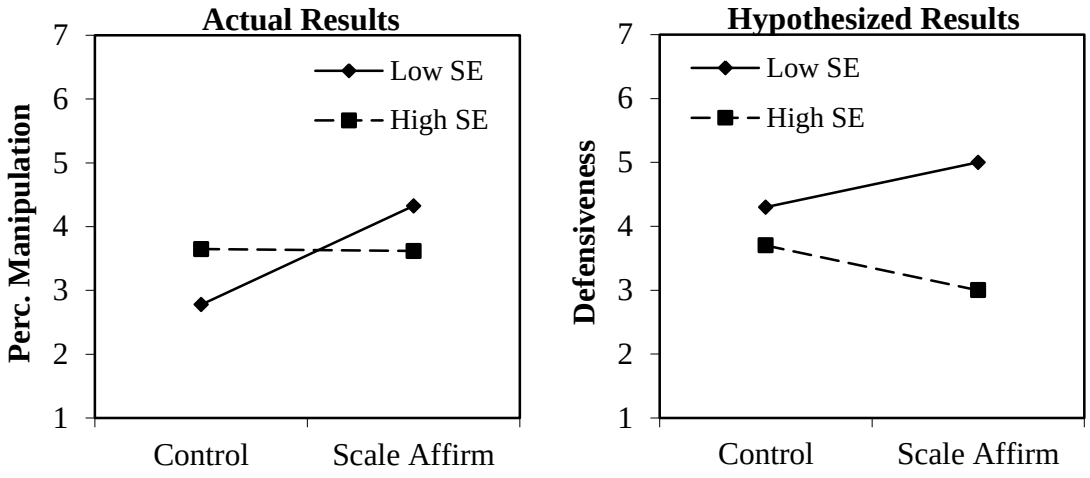


Figure 3.4 Scale Affirm x self-esteem effect on perceived manipulation in the high threat message condition

Left: Predicted values for perceived manipulation among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for defensiveness among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Table 3.12 Regression Analyses with Defensiveness Measures as Dependent Variables in the Low Threat Condition

	Psychological Discomfort		Anger		Message Skepticism		Message Derogation		Perceived Manipulation	
n = 146	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	1.78***	.21	1.65***	.18	2.44***	.20	2.43***	.18	2.79***	.23
Current Flossing Behavior	-.14*	.06	-.09*	.05	-.08	.05	-.09	.05	-.15	.05
Spon. Self-Affirmation	.19*	.09	.24**	.07	-	-	-	-	-	-
Essay Aff 1	.02	.30	-.14	.25	-.42	.29	-.29	.26	-.60*	.30
Essay Aff 2	.23	.31	.04	.26	.32	.29	.17	.26	-.09	.31
Scale Aff	.64*	.29	.49*	.24	-.54*	.27	-.28	.24	-.39	.29
Self-esteem	-.36***	.09	-.29***	.08	-.05	.08	-.08	.07	-.05	.08
R^2 ($\Delta R^2_{\text{Step 2}}$)	.221 (.129)		.230 (.019)		.097 (.081)		.071 (.037)		.084 (.035)	
(Constant)	1.69***	.23	1.60***	.19	2.42***	.22	2.46***	.19	2.67***	.23
Current Flossing Behavior	-.14*	.06	-.09*	.05	-.08	.05	-.09	.05	-.15	.05
Spon. Self-Affirmation	.18*	.09	.23**	.07	-	-	-	-	-	-
Essay Aff 1	.11	.32	-.08	.26	-.39	.30	-.31	.27	-.47	.32
Essay Aff 2	.33	.32	.11	.27	.30	.30	.17	.27	-.00	.32
Scale Aff	.71*	.30	.51*	.25	-.53†	.28	-.33	.25	-.29	.30
Self-esteem	-.17	.21	-.19	.18	-.02	.19	-.15	.17	.21	.21
SE x Essay Aff 1	-.20	.25	-.02	.21	.11	.24	.20	.21	-.17	.25
SE x Essay Aff 2	-.16	.28	-.02	.23	-.17	,26	.18	.23	-.37	.28
SE x Scale Aff	-.32	.26	-.29	.21	-.12	.24	-.12	.22	-.42	.26
R^2 ($\Delta R^2_{\text{Step 3}}$)	.229 (.009)		.230 (.019)		.111 (.014)		.096 (.025)		.107 (.023)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-Affirmation refers to spontaneous self-affirmation tendency.

Table 3.13 Regression Analyses with Defensiveness Measures as Dependent Variables in the High Threat Condition

	Psychological Discomfort		Anger		Message Skepticism		Message Derogation		Perceived Manipulation	
n = 148	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	1.22***	.21	1.65***	.18	2.70***	.27	2.92***	.26	2.79***	.21
Current Flossing Behavior	-.20**	.06	-.09*	.05	-.25**	.08	-.19†	.07	-.15**	.05
Spon. Self-Affirmation	.13	.08	.24**	.07	-	-	-	-	-	-
Essay Aff 1	.01	.31	-.14	.25	-.57	.39	.13	.39	-.60*	.30
Essay Aff 2	.16	.30	.04	.26	.41	.38	.34	.37	-.09	.31
Scale Aff	.28	.32	.49*	.24	.65	.40	.47	.39	-.39	.29
Self-esteem	-.36***	.09	-.29***	.08	.02	.11	.02	.11	-.05	.08
R^2 ($\Delta R^2_{\text{Step 2}}$)	.198 (.095)		.171 (.076)		.153 (.060)		.063 (.011)		.107 (.034)	
(Constant)	1.22***	.21	1.60***	.19	2.68***	.27	2.92***	.26	2.67***	.26
Current Flossing Behavior	-.19**	.06	-.09**	.05	-.28***	.08	-.22**	.08	-.15**	.07
Spon. Self-Affirmation	.15†	.09	.23	.07	-	-	-	-	-	-
Essay Aff 1	.03	.31	-.08	.26	-.63	.39	-.07	.39	-.47	.38
Essay Aff 2	.17	.30	.11	.27	.42	.38	.34	.37	.00	.36
Scale Aff	.29	.32	.51*	.25	.57	.40	.41	.40	-.29	.38
Self-esteem	-.31	.20	-.19	.18	.12	.26	-.06	.25	.21	.25
SE x Essay Aff 1	-.20	.28	-.02	.21	.21	.34	.33	.34	-.17	.33
SE x Essay Aff 2	.03	.27	-.02	.23	-.08	.33	.13	.33	-.38	.32
SE x Scale Aff	-.06	.26	-.29	.21	-.38	.33	-.08	.32	-.42†	.31
R^2 ($\Delta R^2_{\text{Step 3}}$)	.204 (.006)		.190 (.019)		.176 (.023)		.076 (.013)		.154 (.047)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-Affirmation refers to spontaneous self-affirmation tendency.

2. Role of Self-Esteem in Self-Affirmation Effects on Message Acceptance

Perceived Convincingness

Unexpectedly, no interaction effect of self-esteem x self-affirmation was found in either high or low threat condition. There was no main effect of self-esteem or self-affirmation, either (See *Table 3.14* and *Table 3.15* for regression analysis results).

Perceived Pleasantness

Low Threat Condition. No interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem or self-affirmation either (See *Table 3.14* for regression analysis results).

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem either. However, there was a main effect of ***Scale Affirm***, $\Delta R^2_{\text{Step 2}} = .037$, $b = -.770$, $t(141) = -2.31$, $p = .023$ (See *Table 3.15* for regression analysis results). This means that participants who affirmed a range of values (i.e., Scale affirmation) expressed lower levels of perceived pleasantness than participants in other self-affirmation/control conditions, regardless of their self-esteem levels.

Perceived Relevance

Low Threat Condition. No interaction effect of self-esteem x self-affirmation was found. There was no main effect of self-esteem either. However, there was a main effect of ***Scale Affirm***, $\Delta R^2_{\text{Step 2}} = .048$, $b = .632$, $t(140) = 1.84$, $p = .067$ (See *Table 3.14* for regression analysis results). This means that participants who affirmed a range of values (i.e., Scale affirmation) expressed higher levels of perceived relevance than participants in other self-affirmation/control conditions, regardless of their self-esteem levels.

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem or self-affirmation either (See *Table 3.15* for regression analysis results).

Table 3.14 Regression Analyses with Message Acceptance Measures as Dependent Variables in the Low Threat Condition

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
n = 146	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.51***	.16	5.22***	.19	4.88***	.25
Flossing Behavior	-	-	.06	.05	-	-
Spon. Self-Affirm.	.03	.06	.07	.08	.26**	.10
Essay Aff 1	.02	.23	-.09	.27	.26	.37
Essay Aff 2	-.24	.23	-.43	.28	.07	.37
Scale Aff	.33	.21	-.09	.26	.63†	.34
Self-esteem	.01	.07	.07	.08	-.17	.11
R^2 ($\Delta R^2_{\text{Step 2}}$)	.051 (.049)		.062 (.026)		.076 (.048)	
(Constant)	5.45***	.17	5.22***	.21	4.92***	.27

Flossing Behavior	-	-	.06	.05	-	-
Spon. Self-Affirm.	.03	.06	.07	.08	.27**	.10
Essay Aff 1	.06	.24	-.08	.29	.20	.38
Essay Aff 2	-.18	.24	-.37	.29	.02	.38
Scale Aff	.40†	.22	-.07	.29	.62†	.36
Self-esteem	.13	.26	.10	.19	-.27	.25
SE x Essay Aff 1	-.29	.19	-.12	.22	-.07	.30
SE x Essay Aff 2	-.12	.21	.10	.25	.05	.33
SE x Scale Aff	.00	.19	-.05	.23	.37	.31
R^2 ($\Delta R^2_{\text{Step 3}}$)	.079 (.028)		.069 (.008)		.098 (.022)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Flossing Behavior refers to current flossing behavior. Spon. Self-Affirm. refers to spontaneous self-affirmation tendency.

Table 3.15 Regression Analyses with Message Acceptance Measures as Dependent Variables in the High Threat Condition

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
n = 148	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.37***	.20	5.72**	.22	4.92***	.27
Flossing Behavior	-	-	.10	.06	-	-
Spon. Self-Affirm.	.05	.08	.15†	.09	.27	.10
Essay Aff 1	-.04	.29	-.47	.33	.20	.38
Essay Aff 2	-.15	.28	-.26	.31	.02	.38
Scale Aff	-.15	.30	-.77*	.33	.62†	.36
Self-esteem	.04	.09	.01	.10	-.27	.25
R^2 ($\Delta R^2_{\text{Step 2}}$)	.010 (.005)		.062 (.026)		.098 (.022)	
(Constant)	5.37***	.20	5.71***	.22	4.93***	.28
Flossing Behavior	-	-	.10	.06	-	-
Spon. Self-Affirm.	.05	.08	.15	.09	.21	.12
Essay Aff 1	-.04	.30	-.51	.33	-.14	.27
Essay Aff 2	-.15	.28	-.28	.32	-.37	.42

Scale Aff	-.15†	.31	-.76*	.34	.28	.40
Self-esteem	.01	.19	.05	.21	-.25	.27
SE x Essay Aff 1	-.01	.27	.10	.30	-.13	.37
SE x Essay Aff 2	.07	.25	-.20	.28	.26	.35
SE x Scale Aff	.03	.25	-.01	.27	.08	.34
R^2 ($\Delta R^2_{\text{Step 3}}$)	.011 (.001)		.069 (.008)		.053 (.010)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Flossing Behavior refers to current flossing behavior. Spon. Self-Affirm. refers to spontaneous self-affirmation tendency.

3. Role of Self-Esteem in Self-Affirmation Effects on Attitude and Intentions

Attitude

Low Threat C ondition. The regression analysis demonstrated an interaction between ***Essay Affirm 2 and self-esteem*** and an interaction between ***Scale Affirm and self-esteem*** on attitude toward floss every day, $\Delta R^2_{\text{Step 3}} = .026$, $b_{\text{Essay 2}} = .334$, $t(136) = 1.90$, $p = .060$, $b_{\text{Scale}} = .293$, $t(136) = 1.79$, $p = .076$ (See *Table 3.16* for regression analysis results).

Regarding the interaction between ***Essay Affirm 2 and self-esteem***, simple slope analyses showed that the slopes for participants with HSE (+1SD) ($b = .329$, $t(136) = 1.14$, $p = .256$) or with LSE (-1SD) ($b = -.531$, $t(136) = -1.65$, $p = .101$) were not statistically significantly different from zero. However, the slope for participants with LSE was sufficiently lower than the slope for participants with HSE ($Z = 1.99$, $p = .023$, one tailed).

This suggests that participants with HSE (+1SD) who affirmed a value more important than "independent (autonomous)" (i.e., Essay affirmation 2) showed more favorable daily flossing attitude than their unaffirmed counterparts, while people with LSE (-1SD) who affirmed a value more important than "independent (autonomous)" showed less favorable daily flossing attitude compared to their unaffirmed counterparts (See *Figure 3.5*).

Regarding the interaction between ***Scale Affirm and self-esteem***, simple slope analyses showed that among participants with HSE (+1SD), affirming a range of values had a positive effect on daily flossing attitude, $b = .427$, $t(136) = 1.69$, $p = .093$. However, among participants with LSE (-1SD), affirming a range of values had no effect on their daily flossing attitude, $b = -.327$, $t(136) = -1.04$, $p = .302$.

This suggests that participants with HSE (+1SD) who affirmed a range of values showed more favorable daily flossing attitude than their unaffirmed counterparts, while people with LSE (-1SD) who affirmed a range of values showed no change on daily flossing attitude compared to their unaffirmed counterparts (See *Figure 3.5*).

High Threat Condition. Unexpectedly, no interaction effect of self-esteem x self-affirmation was found. There were no main effects of self-esteem or self-affirmation either (See *Table 3.17* for regression analyses results).

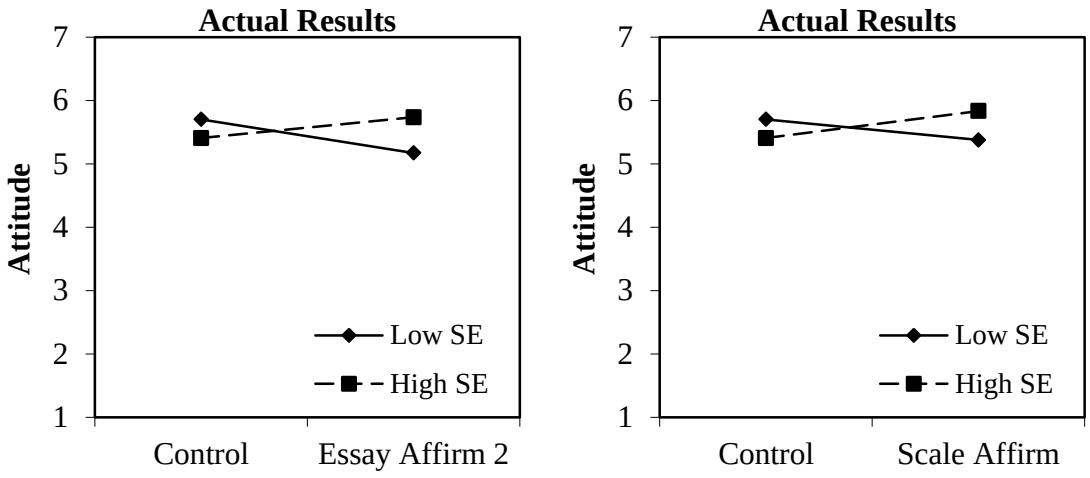


Figure 3.5 Essay Affirm x self-esteem and Scale Affirm x self-esteem effects on attitude in the low threat message condition

Left: Predicted values for daily flossing attitude among participants who affirmed a value more important than "independent (autonomous)" (i.e., Essay affirmation 2 condition) and unaffirmed participants (i.e., Control condition) with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Predicted values for daily flossing attitude among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention

Low Threat Condition. As expected, no interaction effect was found. There were no main effects of self-esteem either. However, there was a main effect of ***Essay Affirm 1*** on intention to floss daily, $\Delta R^2_{\text{Step 2}} = .023$, $b = .673$, $t(139) = 2.17$, $p = .032$, on intention to floss daily in the ***following week***, $\Delta R^2_{\text{Step 2}} = .030$, $b = .865$, $t(139) = 2.24$, $p = .027$, on intention to floss daily in the ***following month***, $\Delta R^2_{\text{Step 2}} = .025$, $b = .881$, $t(139)$

= 2.31, p = .022, and on intention to floss daily in ***next three months***, $\Delta R^2_{\text{Step 2}}$ = .026, b = .946, t(139) = 2.25, p = .026 (See *Table 3.16* for regression analyses results). This means that participants who affirmed a value less important than "independence (autonomous)" (i.e., Essay affirmation 1) expressed higher intention to floss daily, in the following week, in the following month, and in next three months, than participants in other self-affirmation/control conditions, regardless of their self-esteem levels.

High Threat Condition. The regression analysis demonstrated an interaction between ***Scale Affirm and self-esteem*** on intention to floss every day, $\Delta R^2_{\text{Step 3}}$ = .021, b = -.537, t(138) = -2.28, p = .024 (See *Table 3.17* for regression analysis results). Simple slope analysis showed that among participants with HSE (+1SD), affirming a range of values had a negative effect on daily flossing intention, b = -.873, t(140) = -2.04, p = .043. However, among participants with LSE (-1SD), affirming a range of values had no effect on their daily flossing intention, b = .495, t(140) = 1.21, p = .229.

Contrary to the hypothesis, participants with HSE (+1SD) who affirmed a range of values (i.e., Scale affirmation) showed lower daily flossing intentions than their unaffirmed counterparts, while people with LSE (-1SD) who affirmed a range of values showed no change on daily flossing intentions compared to their unaffirmed counterparts (See *Figure 3.6*).

In addition, the regression analysis demonstrated an interaction between ***Scale Affirm and self-esteem*** on intention to floss every day for the ***following week***, $\Delta R^2_{\text{Step 3}}$ = .030, b = -.646, t(140) = -2.31, p = .022 (See *Table 3.17* for regression analysis results).

Simple slope analysis showed that among participants with HSE (+1SD), affirming a range of values had a negative effect on daily flossing intention in the next week, b = -1.209, $t(140)$ = -2.37, p = .019. However, among participants with LSE (-1SD), affirming a range of values had no effect on their daily flossing intention in the next week, b = .435, $t(140)$ = .899, p = .370.

Contrary to the hypothesis, participants with HSE (+1SD) who affirmed a range of values (i.e., Scale affirmation) showed lower daily flossing intention in the following week than their unaffirmed counterparts, while people with LSE (-1SD) who affirmed a range of values showed no change on daily flossing intentions in the following week compared to their unaffirmed counterparts (See *Figure 3.6*).

Moreover, the regression analysis demonstrated an interaction between ***Scale Affirm and self-esteem*** on intention to floss every day for the ***following month***, $\Delta R^2_{\text{Step 3}}$ = .012, b = -.525, $t(140)$ = -1.79, p = .076 (See *Table 3.17* for regression analysis results). Simple slope analysis showed that among participants with HSE (+1SD), affirming a range of values had a negative effect on daily flossing intention in the next month, b = -.912, $t(140)$ = -1.71, p = .090. However, among participants with LSE (-1SD), affirming a range of values had no effect on their daily flossing intention in the next month, b = .424, $t(140)$ = .831, p = .407.

Contrary to the hypothesis, participants with HSE (+1SD) who affirmed a range of values (i.e., Scale affirmation) showed lower daily flossing intention in the following month than their unaffirmed counterparts, while people with LSE (-1SD) who affirmed a

range of values showed no change on daily flossing intentions in the following month compared to their unaffirmed counterparts (See *Figure 3.6*).

Last, the regression analysis demonstrated an interaction between ***Scale Affirm and self-esteem*** on intention to floss every day for ***next three months***, $\Delta R^2_{\text{Step 3}} = .013$, $b = -.554$, $t(140) = -1.83$, $p = .070$ (See *Table 3.17* for regression analysis results). Simple slope analysis showed that among participants with LSE (-1SD), affirming a range of values had a negative effect on daily flossing intention in the next three months, $b = .925$, $t(140) = 1.76$, $p = .081$. However, among participants with LSE (-1SD), affirming a range of values had no effect on their daily flossing intention in the next three months, $b = -.485$, $t(140) = -.875$, $p = .383$.

Contrary to the hypothesis, participants with LSE (-1SD) who affirmed a range of values (i.e., Scale affirmation) showed higher daily flossing intention in next three months than their unaffirmed counterparts, while people with HSE (+1SD) who affirmed a range of values showed no change on daily flossing intentions in next three months compared to their unaffirmed counterparts (See *Figure 3.6*).

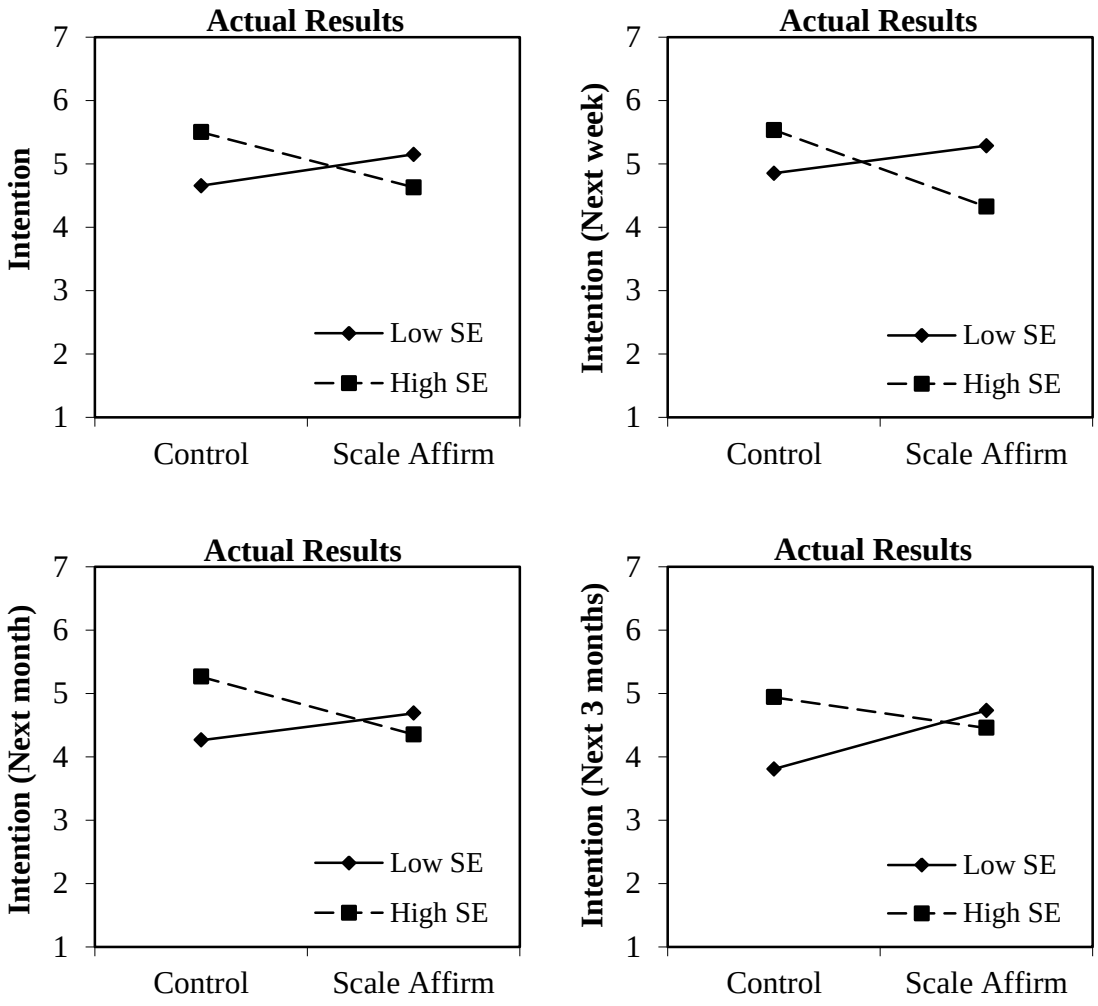


Figure 3.6 Scale Affirm x self-esteem interaction effect on intention in the high threat message condition

Top row:

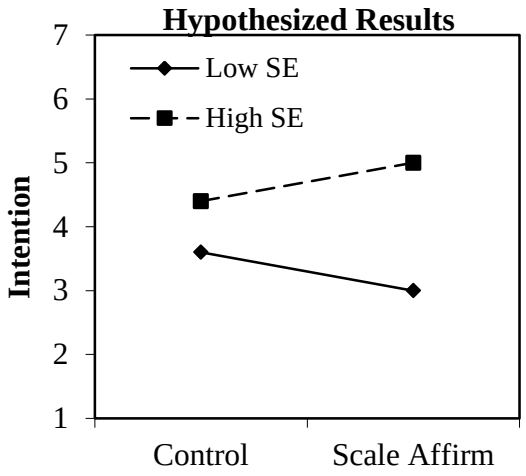
Left: Predicted values for daily flossing intention among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with LSE (1 SD below the mean) and HSE (1 SD above the mean)

Right: Predicted values for daily flossing intention in the following week among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with LSE (1 SD below the mean) and HSE (1 SD above the mean)

Bottom row:

Left: Predicted values for daily flossing intention in the following month among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with LSE (1 SD below the mean) and HSE (1 SD above the mean) in the high threat message condition

Right: Predicted values for daily flossing intention in next three months among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with LSE (1 SD below the mean) and HSE (1 SD above the mean) in the high threat message condition



Hypothesized results for daily flossing intention among participants who affirmed a range of values (i.e., Scale affirmation condition) and unaffirmed participants (i.e., Control condition) with LSE (1 SD below the mean) and HSE (1 SD above the mean) in the high threat message condition

Table 3.16 Regression Analyses with Attitude and Intention Measures as Dependent Variables in the Low Threat Condition

	Attitude		Intention		Intention (Next Week)		Intention (Next Month)		Intention (Next 3 Mos.)	
n = 146	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.46***	.15	4.88***	.22	4.75***	.28	4.45***	.28	4.33***	.31
Current Flossing Behavior	.16***	.04	.51***	.06	-.08	.10	.61***	.09	.61***	.08
Spon. Self-Affirmation	-.00	.05	-.11	.09	.58	.07	-.13	.11	-.15	.13
Essay Aff 1	.40	.20	.67*	.31	.87	.39	.87*	.41	.91*	.45
Essay Aff 2	-.04	.20	.37	.32	.46	.39	.46	.41	.31	.45
Scale Aff	.14	.19	.24	.29	.24	.37	.35	.39	.08	.43
Self-esteem	.10	.06	.10	.09	-.05	.26	.02	.12	.04	.14
R^2 ($\Delta R^2_{\text{Step 2}}$)	.198 (.048)		.428 (.023)		.396 (.032)		.398 (.024)		.362 (.026)	
(Constant)	5.56***	.15	4.90***	.24	4.75***	.28	4.52***	.31	4.42***	.34
Current Flossing Behavior	.16***	.04	.52***	.06	-.08	.10	.62***	.08	.62***	.09
Spon. Self-Affirmation	.00	.05	-.11	.09	.58	.07	-.13	.12	-.15	.13
Essay Aff 1	.29	.20	.66*	.33	.87	.39	.79†	.43	.82†	.48
Essay Aff 2	-.10	.21	.37	.33	.46	.39	.41	.43	.20	.48
Scale Aff	-.05	.19	.22	.31	.24	.37	.26	.41	-.01	.45
Self-esteem	-.12	.14	.07	.22	-.05	.26	-.15	.29	-.17	.32
SE x Essay Aff 1	.17	.16	.06	.26	.26	.30	.26	.34	.36	.37
SE x Essay Aff 2	.33†	.18	.06	.28	.15	.34	.24	.37	.15	.41
SE x Scale Aff	.29†	.16	-.00	.26	.16	.31	.09	.35	.19	.39
R^2 ($\Delta R^2_{\text{Step 3}}$)	.224 (.026)		.429 (.001)		.399 (.003)		.402 (.004)		.368 (.005)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-Affirmation refers to spontaneous self-affirmation tendency.

Table 3.17 Regression Analyses with Attitude and Intention Measures as Dependent Variables in the High Threat Condition

	Attitude		Intention		Intention (Next Week)		Intention (Next Month)		Intention (Next 3 Mos.)	
n = 148	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.61***	.14	5.10***	.20	5.21***	.23	4.77***	.27	4.38***	.27
Current Flossing Behavior	.26***	.04	.64***	.06	.69***	.07	.73***	.08	.78***	.08
Spon. Self-Affirmation	.02	.05	.10	.08	.10	.09	.14	.11	.18	.11
Essay Aff 1	-.27	.20	-.37	.29	-.34	.34	-.46	.41	-.18	.42
Essay Aff 2	-.09	.19	-.10	.27	-.22	.33	-.06	.38	.06	.38
Scale Aff	-.16	.20	-.11	.29	-.26	.35	-.08	.40	.39	.40
Self-esteem	.05	.06	.09	.09	.03	.10	.11	.12	.08	.12
R^2 ($\Delta R^2_{\text{Step 2}}$)	.290 (.013)		.530 (.009)		.475 (.004)		.494 (.010)		.522 (.009)	
(Constant)	5.61***	.14	5.08***	.19	5.19***	.23	4.77***	.27	4.37***	.27
Current Flossing Behavior	.27***	.04	.62***	.06	.67***	.07	.71***	.08	.78***	.08
Spon. Self-Affirmation	.03	.06	.07	.08	.06	.09	.10	.11	.16	.12
Essay Aff 1	-.27	.20	-.37	.29	-.36	.34	-.49	.42	-.17	.43
Essay Aff 2	-.09	.19	-.07	.27	-.19	.32	-.05	.38	.07	.39
Scale Aff	-.13	.20	-.19	.29	-.39	.35	-.15	.40	.36	.41
Self-esteem	.09	.13	.33†	.19	.27	.22	.27	.27	.36	.27
SE x Essay Aff 1	-.05	.18	-.18	.26	-.08	.31	-.01	.35	-.25	.36
SE x Essay Aff 2	-.14	.17	-.12	.24	-.03	.29	-.14	.35	-.29	.36
SE x Scale Aff	.01	.16	-.54*	.24	-.65*	.28	-.34	.33	-.42	.33
R^2 ($\Delta R^2_{\text{Step 3}}$)	.296 (.006)		.551 (.021)		.506 (.030)		.501 (.007)		.529 (.007)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-Affirmation refers to spontaneous self-affirmation tendency.

Supplemental Analyses

The Essay Affirmations

It is interesting to note that no self-affirmation x self-esteem interaction effects were found on any dependent variables when the two essay affirmation conditions were compared with the control condition. This means that completing an essay affirmation task or a control task did not produce differential effects on heath message processing for people with HSE and LSE. But this does not mean that the effects of affirming a more important value (i.e., Essay Affirm 2) would not differ from affirming a less important value (i.e., Essay Affirm 1). In fact, because it was expected that for people with LSE, affirming a value more important than the aspect of self threatened would reduce defensiveness, while affirming a value less important than the aspect of self threatened would increase defensiveness, the differences in defensiveness between participants with LSE in the essay affirmation 1 condition and their counterparts in the essay affirmation 2 condition should be larger than that between participants with LSE in the essay affirmation 1 (or essay affirmation 2) condition and their counterparts in the control condition. However, for people with HSE, it is expected that affirming a more important value or a less important value would not make a difference on self-affirmation effects. Therefore, completing the Essay Affirmation 2 task (versus completing the Essay Affirmation 1 task) is expected to have a negatively effect on defensiveness for people with LSE, but not for people with HSE.

To examine whether the two essay affirmations differ in their effects on message processing for people with HSE and LSE, I compared Essay Affirm 1 condition with Essay Affirmation 2 condition. I conducted regression analyses for the low and high threat conditions for each dependent variable. In each regression model, current flossing behavior and spontaneous self-affirmation tendency were entered at step 1 as control variables, mean-centered self-esteem and dummy-coded essay affirmation condition variable (i.e., Essay Affirm 1 = 0, Essay Affirm 2 = 1) were entered at step 2, and the two-way interaction terms of essay affirmation x self-esteem were entered at step 3. Unexpectedly, there was no essay affirmation x self-esteem interaction effect on any dependent variable, in either low or high threat message conditions. In terms of main effect, completing the essay affirmation 2 task rather than essay affirmation 1 task increased message skepticism, regardless of participants' self-esteem levels, $\Delta R^2_{\text{Step 2}} = .117$, $b = 1.087$, $t(69) = 2.90$, $p = .005$. These results suggest that there was no evidence that completing the essay affirmation 2 task differed from completing the essay affirmation 1 task regarding self-affirmation effects on health message processing among people with HSE and LSE.

The Distribution of Self-Esteem Scores

Why were there self-affirmation x self-esteem interaction effects in certain self-affirmation condition on some dependent variables but not on others? A closer look at the descriptive statistics of self-esteem showed that there might be a methodological reason. The distribution of self-esteem scores in the sample across conditions was negatively

skewed (*Skewness* = -.795): there were many more participants with high levels of self-esteem than participants with low levels of self-esteem (See *Figure 3.7*).

The skewed distribution of self-esteem can pose a methodological challenge for detecting self-esteem x self-affirmation interaction effects. McClelland and Judd (1993) have elegantly described this problem. They note that the statistical power of an interaction test is determined by the residual variance in the interaction term after controlling for variance in the main effects. The residual variance in the interaction term is determined by the joint distribution of the predictor and the moderator variables. Therefore, the statistical power of the interaction test is maximized when both the predictor and moderator variables have maximum variances for their ranges (which means having half of the observations happen at each extreme) and when the extreme values of the predictor variable co-occur with the extreme values of the moderator variable (which means having one fourth of the observations happen at each extreme corner of the 2 x2 design; McClelland & Judd, 1993). In the present study, because there were far fewer observations in the LSE-Control and LSE-Affirm cells than in the HSE-Control and HSE-Affirm cells, the interaction tests may not have had enough statistical power to detect the hypothesized interaction effects.

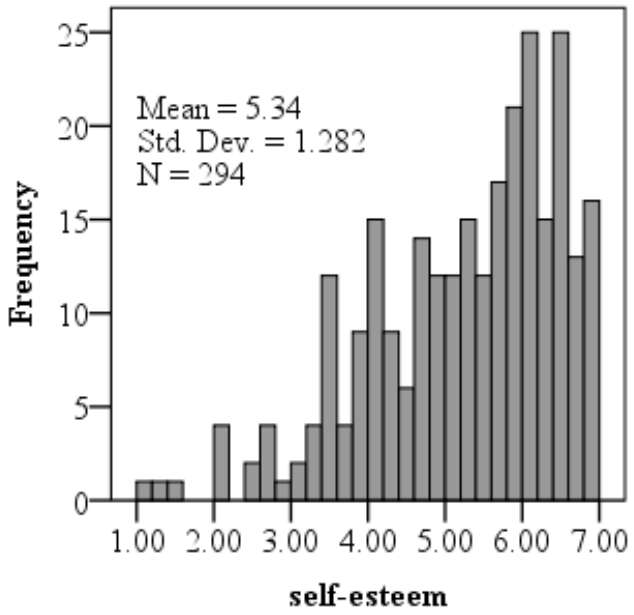


Figure 3.7 Histogram showing the distribution of self-esteem scores in Study 2

To reduce the skewness of the distribution of self-esteem scores, I tried data transformation by first reflecting the scores through subtracting them from the maximum score "7" plus one and then taking logarithms of the reflected scores (i.e., Transformed self-esteem = log10(max + 1 - self-esteem)). The transformation reduced skewness to -.083 (See *Figure 3.8* for new distribution). It is important to note that transforming self-esteem scores cannot solve the problem that there were not as many participants with LSE as there were participants with HSE. Also, because the majority of the observations of the new distribution were at the center rather than at the two extremes, transforming self-esteem may not help improving the statistical power of the interaction tests.

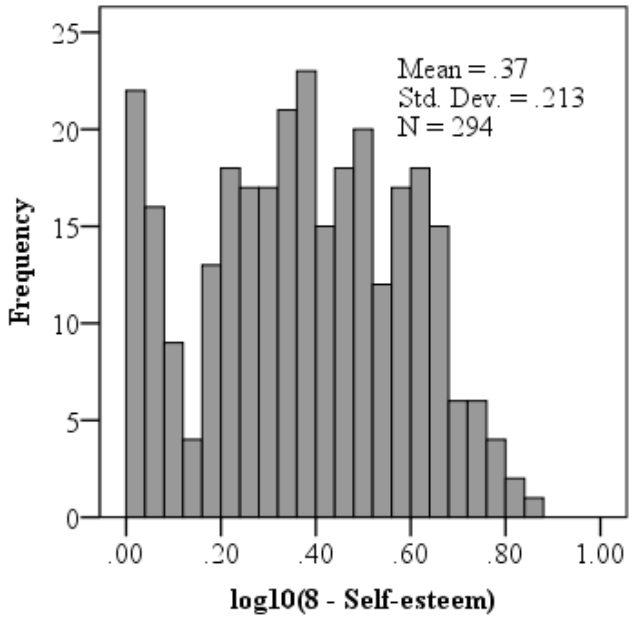


Figure 3.8 Histogram showing the distribution of transformed self-esteem scores

I then tested the transformed self-esteem x self-affirmation interactions on the dependent variables. Two regression models were built for the low and high threat conditions for each dependent variable. In each regression model, mean-centered transformed self-esteem and dummy-coded affirmation condition variables (i.e, Essay Affirm 1, Essay Affirm 2, Scale Affirm) were entered at step 1 and the two-way interaction terms of transformed self-esteem x self-affirmation were entered at step 2.

Transforming self-esteem scores did not lead to discovery of new interaction effects. Consistent with the original results, the analyses using the transformed self-esteem scores demonstrated an interaction between Scale Affirm and transformed self-

esteem on perceived manipulation, intention to floss daily, and intention to floss daily in the following week. Transforming self-esteem scores did not change the nature of the previously identified interactions; it only slightly changed the effect sizes (e.g., on perceived manipulation: $\Delta R^2_{\text{Step 3-Transformed}} = .045$ vs. $\Delta R^2_{\text{Step 3-Original}} = .047$; on daily flossing intention: $\Delta R^2_{\text{Step 3-Transformed}} = .014$ vs. $\Delta R^2_{\text{Step 3-Original}} = .021$; on daily flossing intention in the following week: $\Delta R^2_{\text{Step 3-Transformed}} = .023$ vs. $\Delta R^2_{\text{Step 3-Original}} = .030$).

The above findings suggest that it is possible that the skewed distribution of self-esteem scores limited the possibility of finding the hypothesized effects for people with LSE. Because the majority of the sample consisted of people with HSE, in general, the analyses only tested the self-affirmation effects among people with HSE. This provided a potential explanation for the null effects of the two essay affirmation conditions. Given that the hypothesized effects of the two essay affirmation conditions mainly concerning people with LSE, if the population that was expected to exhibit the effects was not sufficiently represented in the sample, it is unlikely that the hypothesized effects will be observed.

Discussion

Unexpectedly, my hypothesis that affirming a value less important than the aspect of self threatened would increase defensiveness and decrease message acceptance, attitude, and intention among people with LSE, but not for those with HSE, was not supported. When the Essay Affirmation 1 condition was compared to the control

condition, no interaction was found between self-esteem and Essay Affirmation 1 on any dependent variables.

In addition, my hypothesis that affirming a value more important than the aspect of self threatened would decrease defensiveness and increase message acceptance, attitude, and intention among people with LSE, but not for those with HSE, was not supported, either. When the Essay Affirmation 2 condition was compared to the control condition, no interaction was found between self-esteem and Essay Affirmation 2 on any dependent variables.

Moreover, my hypothesis that affirming a range of values would increase defensiveness among people with LSE and decrease message acceptance, attitude, and intention, but not for those with HSE, was partially supported. In the high threat message condition, participants with LSE who affirmed a range of values showed higher perceived manipulation than their unaffirmed counterparts, while people with HSE who affirmed a range of values showed no change compared to their unaffirmed counterparts. However, this pattern of results did not carry over to message acceptance or attitude and intention toward daily flossing. There was no interaction between self-affirmation and self-esteem on message acceptance indicators or on attitude toward daily flossing. Regarding daily flossing intention, in the high threat message condition, affirming a wide range of values decreased daily flossing intentions among people with HSE but not among people with LSE (See *Table 3.18* for summary of findings).

Table 3.18 Summary of Study 2 Findings

Hypotheses	Results	
Affirming a value less important than the one threatened:	Compare Essay Affirm 1 condition & control condition	
· ***Increases*** defensiveness among people with **LSE** but not among people with **HSE**	Not supported	· High threat: ***decreased*** message skepticism regardless of self-esteem level
· ***Decreases*** message acceptance among people with **LSE** but ***not*** among people with **HSE**	Not supported	· ***No change*** in message acceptance indicators
· ***Decreases*** attitude and intention among people with **LSE** but ***not*** among people with **HSE**	Not supported	· Low threat condition: ***increased*** sunscreen use intentions regardless of self-esteem level
Affirming a value more important than the one threatened:	Compare Essay Affirm 2 condition & control condition	
· ***Decreases*** defensiveness among people with **LSE** but ***not*** among people with **HSE**	Not supported	· ***No change*** in defensiveness indicators
· ***Increases*** message acceptance among people with **LSE** but ***not*** among people with **HSE**	Not supported	· ***No change*** in message acceptance indicators
· ***Increases*** attitude and intention among people with **LSE** but ***not*** among people with **HSE**	Not supported	· Low threat: ***Increased*** attitude among people with **HSE** but ***decreased*** it among people with **LSE**
Affirming a wide range of values:	Compare Scale Affirm condition & control condition	

· ***Decreases*** defensiveness among people with **HSE** but ***increases*** it among people with **LSE**	Supported	· Low threat: ***increased*** psychological discomfort and anger, but ***decreased*** message skepticism regardless of self-esteem level · High threat: ***increased*** perceived manipulation among people with **LSE** but ***not*** among people with **HSE**. · High threat: ***increased*** perceived message skepticism regardless of self-esteem level
· ***Increases*** message acceptance among people with **HSE** but ***decreases*** it among people with **LSE**	Not supported	· Low threat: ***increased*** perceived convincingness regardless of self-esteem level · High threat: ***decreased*** perceived pleasantness regardless of self-esteem level
· ***Increases*** attitude and intention among people with **HSE** but ***decreases*** them among people with **LSE**	Not supported (Contradicted)	· Low threat: ***Increased*** attitude among people with **HSE** but ***not*** among people with **LSE** · High threat: ***Decreased*** intention among people with **HSE** but ***not*** among people with **LSE**

In conclusion, Study 2 showed that affriming a wide range of values increased perceived manipulation among people with LSE but reduced behavior intention among people with HSE. In addition, among those who perceived that having gum disease will cause moderate to serious health, finacial, and/or social consequences, affirming a value less important than the aspect of self being threatened by the message (i.e., Essay affirmation 1) increased psychological discomfort, anger, perceived manipulation and reduced daily flossing intention among people with LSE but not HSE.

These findings provided partial support to my hypothesis that when self-affirmation manipulation failed to achieve an adequate sense of self-integrity among people with LSE, it can backfire. Interestingly, the only situation hypothesized to benefit people with LSE, affirming a value more important than the aspect of self being threatened (i.e., Essay affirmation 2), showed no beneficial effects at all in the high threat message condition, among both people with LSE and those with HSE.

It is surprising that the same self-affirmation effect identified in study 1 was not replicated in study 2. Because study 2 differed from study 1 on a number of fronts, it is difficult to identify what exactly caused the inconsistencies in the two studies' findings. For example, Study 2 used a general population sample that was much more heterogeneous than the college student sample used in Study 1: the Study 2 sample included adults with a wide range of ages, education levels, and household income levels (See *Appendix A.2*). Also, the distribution of self-esteem scores in the Study 2 sample was more heavily skewed than the Study 1 sample. Moreover, Study 2 used a health behavior context (i.e., daily flossing) that is more universally relevant than the sunscreen use behavior context in Study 1.

CHAPTER 4: STUDY 3 – TIMING OF SELF-AFFIRMATION

Abstract

The present study tested whether the timing of self-affirmation in relation to exposure to an anti-excessive drinking message (i.e., self-affirm before or after message exposure) determines when self-affirmation benefits people with HSE versus LSE. It was expected that affirming their most important value *before* message exposure reduces defensive processing among people with LSE but not HSE, while affirming their most important value *after* message exposure increases defensive processing among people with HSE but not LSE. In addition, affirming a range of values before message exposure was expected to decrease defensive processing for people with HSE but increase defensive processing among people with LSE, while affirming a range of values after message exposure was expected to increase defensive processing for people with HSE but not LSE.

Data on alcohol intake from 426 U.S. adults showed that regardless of the timing and the type of self-affirmation manipulation, self-affirmation reduced defensive processing among people with HSE but not LSE. For participants with HSE, affirming their most important value or a range of values before or after message exposure resulted in lower defensive responses and higher message acceptance, though the effects did not carry over to attitude and intention regarding reducing alcohol intake. In contrast, there was no effect of self-affirmation manipulation on outcomes for participants with LSE.

Introduction

In Study 2 (Chapter 3), I explored whether the adequacy of people's sense of the self achieved through the self-affirmation manipulation may determine when self-affirmation benefits people with HSE versus LSE. In the present study, I will test whether a situation-level factor, timing of the self-affirmation manipulation – whether self-affirmation is induced before or after the onset of the threat to self (i.e., health message exposure), may influence when self-affirmation benefits people with HSE versus LSE.

Timing of self-affirmation manipulation influences self-affirmation effects on people with HSE and LSE by determining whether self-esteem functions as *resources* or as *expectancies* (Stone, 1999). Self-affirmation buffers a threat to the sense of self by bringing unthreatened positive cognitions about the self into the working memory; these cognitions then help offset the threat's discomforting implications for the self. On the other hand, directing attention to the self through completing a self-affirmation task can cause self-referencing and make salient one's standards and expectancies for him or herself (Hull & Levy, 1979; Hull et al., 2002). Being aware of one's self-expectancies may highlight any discrepancies between one's self-expectancies and the self-evaluative information in one's environment (e.g., a health message).

Self-affirming *before* health message exposure enables self-esteem to function as *resources* because self-affirmation brings favorable knowledge about the self into the working memory before the threat to the self occurs. Those who have more favorable self-knowledge in the working memory will be more capable of withstanding the threat

than those with less favorable self-knowledge. Recall that, as discussed in Study 2, affirming a range of self-aspects establishes a sense of self-integrity for people with HSE while affirming the most important and positive self-aspect establishes a sense of self-integrity for people with LSE. Therefore, it is expected that compared to unaffirmed people, people with HSE will show reduced defensiveness and increased message acceptance, attitude, and intention if they affirmed a range of self-aspects before exposure to a health message, while people with LSE will reduced defensiveness and increased message acceptance, attitude, and intention if they affirmed their most important self-aspect before exposure to a health message.

Self-affirming *after* health message exposure enables self-esteem to function as *expectancies* because the self-directed attention caused by self-affirmation will increase people's sensitivity to self-evaluative information in the message and highlights any discrepancies between one's self-expectancies and one's health-compromising behavior (e.g., "I always make wise decisions, but I smoke which puts my health at risk"). People with HSE have high expectations for themselves to be competent and prudent while people with LSE have lower expectations for themselves to competent and prudent.

Because the discrepancy between self-expectations and the health-compromising behavior is larger for people with HSE than for people with LSE, reading a health message then directing attention to their expectations for themselves may trigger greater discomfort and thus higher defensiveness for self-affirmed people with HSE than for self-affirmed people with LSE.

In addition, for people with HSE, because the discrepancy between their self-expectations and the health-compromising behavior is large, self-affirmed people with HSE whose discrepancies were highlighted for them through self-affirmation is expected to experience greater discomfort and thus express higher defensiveness compared to their unaffirmed counterparts whose discrepancies were not highlighted for them. For people with LSE, however, because the discrepancy between their self-expectations and their health-compromising behavior is small, highlighting the discrepancy through self-affirmation will not cause much discomfort and thus will not increase defensiveness.

In conclusion, it is hypothesized that, affirming the most important value *before* message exposure will reduce defensiveness, increase message acceptance, attitude, and intention for people with LSE but not HSE, compared to their unaffirmed counter parts. Affirming a range of values *before* message exposure, however, is expected to increase defensiveness, reduce message acceptance, attitude, and intention for people with LSE, but reduce defensiveness, increase message acceptance, attitude, and intention for people with HSE, compared to their unaffirmed counter parts. Self-affirming *after* message exposure, regardless of affirming the most important value or affirming a range of values, is expected to increase defensiveness, reduce message acceptance, attitude, and intention for people with HSE but not LSE, compared to their unaffirmed counter parts (See *Figure 4.1*).

In this study, I chose reducing alcohol consumption as the health behavior topic. To ensure that the health message about reducing alcohol consumption is personally

relevant for every participant, I recruited only people who currently drink more than the recommended low-risk/moderate drinking level.

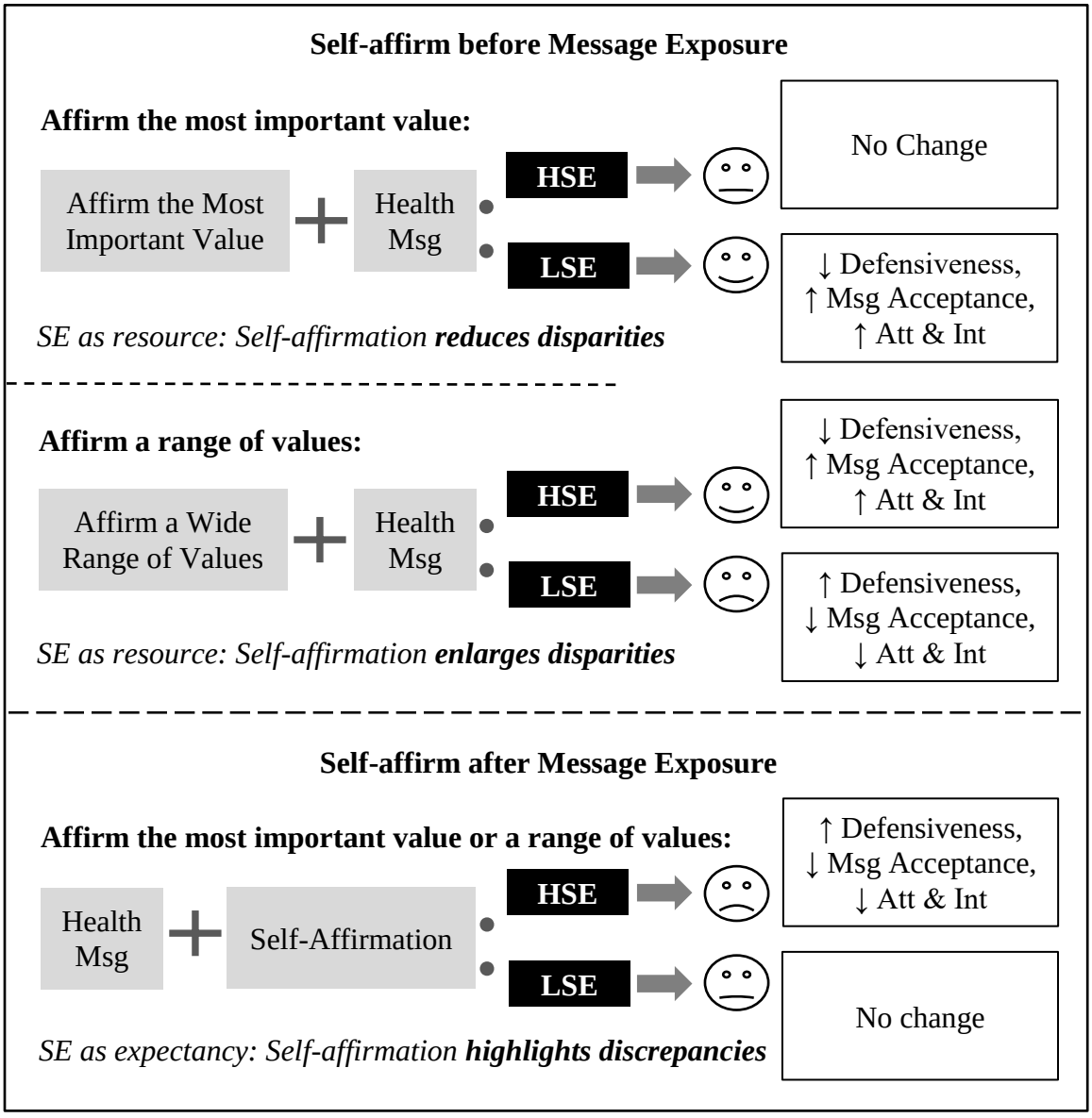


Figure 4.1 Hypothesized interaction effects between self-affirmation and self-esteem on defensiveness, message acceptance, and attitude and intention toward the recommended behavior

Pilot Studies

Pilot Study A

Before the main study design was finalized, a pilot study with a 2 (Self-affirmation task: scale affirmation, no affirmation) by 2 (Timing of self-affirmation: affirm before message exposure, affirm after message exposure) between-subject factorial design was conducted online with 100 UMN undergraduate students.

Participants in the scale self-affirmation condition completed the 32-item self-affirmation scale that was used in study 2 (Napper, Harris, & Epton, 2009) and those in the control condition were asked to write about the shops and buildings they saw on a route that they traveled regularly (Napper, Harris, & Epton, 2009). The timing of self-affirmation was manipulated by displaying a health message before or after participants engaged in the self-affirmation or control task. In the affirm-before-message condition, participants completed the self-affirmation/control task before reading the message. In the affirm-after-message condition, participants read the message first and then completed the self-affirmation/control task.

Results showed that the length of the scale affirmation task had unintended influences on message effects for participants in the affirm-after-message condition: Seven participants in the affirm-after-message condition expressed that they did not remember reading a health message. Therefore, pilot study B and C were conducted to create and test a shorter scale affirmation task.

Pilot Study B

Pilot study B was conducted to select 10 values, personal qualities, or characteristics from the 32-item affirmation scale that people, in general, would consider as the most important to them and would evaluate themselves most positively on. This would reduce scale length by about 2/3. A total of 31 U.S. adults recruited from the Amazon Mechanical Turk panel participated in the study. Participants first answered to what extent each of the 32 value statements described what they are like (e.g., "I always try to keep my word," "I treat all people equally, regardless of who they might be"; 1 = "Not at all like me" – 7 = "Just like me"), then they rated how personally important each of these statements was to them (e.g., "Always try to keep your word," "Treat all people equally, regardless of who they might be"; 1 = "Very unimportant to me" – 7 = "Very important to me").

The self-rating and the corresponding importance rating of each statement were summed to form a composite score for each value statement. I sorted the composite scores of the 32 value statements in a descending order and judged that the score difference between the 10^{th} and the 11^{th} ranked item (10^{th}: M = 12.06, SD = 1.84; 11^{th}: M = 11.84, SD = 1.77) was smaller than that between the 11^{th} and the 12^{th} ranked item (11^{th}: M = 11.84, SD = 1.77; 12^{th}: M = 11.58, SD = 1.96). Therefore, I extended the selection to 11 items. The mean ratings of the top 11 items were compared against the scale affirmation ratings in pilot A (UMN college student sample) and study 2 (MTurk sample). Eight of the 11 items ranked in the top 11 across all three samples and 2 of the

11 items ranked in the top 11 across both MTurk samples. Therefore, the 11 items were selected to form the shortened self-affirmation scale. The mean and standard deviation of each value statement and its ranking in each study sample are shown in *Table 4.1*.

Table 4.1 Ratings of Scale Affirmation Statements Across 3 Studies

	MTurk Sample								Student Sample			
	Study 3 Pilot B				Study 2				Study 3 Pilot A			
	N	*M*[*]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*
My friends can trust me.	31	12.77	1.36	1	76	6.36	0.73	1	51	6.27	1.20	1
I always try to keep my word.	31	12.77	1.36	2	76	6.08	0.88	2	51	6.08	1.16	3
I love to learn new things.	31	12.74	1.69	3	76	5.99	0.92	3	51	6.14	0.80	2
I value my ability to think critically.	31	12.55	1.34	4	76	5.82	1.06	6	51	5.69	1.16	8
I am always curious about the world.	31	12.52	1.75	5	76	5.84	1.22	4	51	5.98	0.95	5
I can express love to someone else.	31	12.48	1.77	6	76	5.79	1.30	7	51	5.37	1.72	14
I treat all people equally, regardless of who they might be.	31	12.35	1.68	7	76	5.84	0.88	5	51	5.76	1.21	7
There are people in my life who care as much about my feelings and well-being as they do about their own.	31	12.23	1.43	8	76	5.5	1.36	10	51	6.04	1.13	4
My friends value my good judgment.	31	12.10	1.62	9	76	5.64	0.93	8	51	5.88	0.93	6
I must stand up for what I believe in, even in the face of strong opposition.	31	12.06	1.84	10	76	5.42	1.13	11	51	5.29	1.25	16
Despite challenges, I always remain hopeful about the future.	31	11.84	1.77	11	76	5.33	1.44	15	51	5.45	1.29	12

Note. [*] This mean score reflects the sum of self-rating and the corresponding importance rating of the value (range: 2-14).
[**] This mean score reflects the self-rating of the value (range: 1-7).

Table 4.2 Ratings of Scale Affirmation Statements Across 3 Studies (Continued)

	MTurk Sample								Student Sample			
	Study 3 Pilot B				Study 2				Study 3 Pilot A			
	N	*M*[*]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*
I always finish what I start.	31	11.58	1.96	12	76	5.24	1.38	18	51	5.1	1.46	20
I try to add some humor to whatever I do.	31	11.55	2.63	13	76	5.41	1.25	12	51	5.55	1.25	9
I go out of my way to cheer up people who appear down.	31	11.48	2.16	14	75	5.05	1.32	22	51	5.55	1.15	10
Being able to come up with new and different ideas and ways of doing things is one of my strong points.	31	11.45	1.67	15	76	5.28	1.32	17	51	5.18	1.29	17
I am never too busy to help a friend.	31	11.45	1.95	16	76	5.36	1.13	13	51	5.37	1.47	15
I love what I do.	31	11.42	1.80	17	76	5.16	1.26	20	51	5.16	1.30	19
I always admit when I am wrong.	31	10.90	2.31	18	76	5.14	1.27	21	51	4.86	1.41	25
I experience deep emotions when I see beautiful things.	31	10.65	2.97	19	76	5.36	1.24	14	50	5.44	1.50	13
I control my emotions.	31	10.42	2.46	20	76	5.24	1.26	19	51	4.92	1.57	23
One of my strengths is helping a group of people work well together even when they have their differences.	31	10.16	2.50	21	76	4.51	1.63	24	51	4.88	1.19	24

Note. [*] This mean score reflects the sum of self-rating and the corresponding importance rating of the value (range: 2-14).
[**] This mean score reflects the self-rating of the value (range: 1-7).

Table 4.3 Ratings of Scale Affirmation Statements Across 3 Studies (Continued)

	MTurk Sample								Student Sample			
	Study 3 Pilot B				Study 2				Study 3 Pilot A			
	N	*M*[*]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*	*N*	*M*[**]	*SD*	*Rank*
One of my strengths is helping a group of people work well together even when they have their differences.	31	10.16	2.50	21	76	4.51	1.63	24	51	4.88	1.19	24
I do not act as though I am a special person.	31	10.16	2.56	22	76	5.62	1.20	9	51	4.49	1.49	29
“Better safe than sorry” is one of my favorite mottoes.	31	9.94	3.15	23	76	5.33	1.37	16	51	4.98	1.14	22
At least once a day I stop and count my blessings.	30	9.90	2.87	24	76	4.13	1.83	28	51	4.14	1.65	31
I am very good at planning group activities.	31	9.29	2.96	25	76	4.08	1.70	29	51	5.02	1.32	21
I never seek vengeance.	31	9.19	2.77	26	76	5.00	1.56	23	51	4.61	1.42	27
I really enjoy being part of a group.	31	9.00	2.98	27	76	4.36	1.52	26	51	5.53	1.21	11
I am a spiritual person.	31	8.87	4.15	28	75	4.23	2.21	27	51	4.25	1.67	30
No matter what the situation, I am able to fit in.	31	8.84	2.77	29	76	4.45	1.46	25	51	5.18	1.29	18
I never get side tracked when I work.	30	8.73	2.18	30	76	3.87	1.74	31	51	4.61	1.42	28
I’m never bored.	31	8.71	3.06	31	75	3.92	1.75	30	51	3.98	1.79	32
I work at my best when I am a member of a group.	31	8.65	2.67	32	76	3.58	1.64	32	51	4.71	1.38	26

Note. [*] This mean score reflects the sum of self-rating and the corresponding importance rating of the value (range: 2-14).
[**] This mean score reflects the self-rating of the value (range: 1-7).

Pilot Study C

To test whether the shortened 11-item self-affirmation scale can achieve comparable self-affirmation effects as the original scale, pilot study C was conducted online with 91 U.S. adults recruited from the Amazon Mechanical Turk panel. Participants were randomly assigned to one of five self-affirmation conditions: 11-item scale affirmation, random 11-item scale affirmation, 32-item scale affirmation, essay affirmation, and control. Participants in the 11-item scale affirmation condition responded to the shortened self-affirmation scale. Participants in the random 11-item scale affirmation condition responded to 11 items that were randomly selected from the 32-item Napper et al. (2009) self-affirmation scale. Participants in the 32-item scale affirmation condition responded to the original 32-item Napper et al. (2009) self-affirmation scale. Participants in the control condition were asked to write about the shops and buildings they saw on a route that they traveled regularly (Napper, Harris, & Epton, 2009). After completing the self-affirmation or control task, participants read the high threat flossing message that was used in study 2. Last, participants filled out a questionnaire containing self-affirmation manipulation check questions, measures of defensiveness and message acceptance. All the measures were adopted from study 2.

As expected, the 11-item self-affirmation scale performed similar to the original 32-item scale and the essay affirmation task. There were no substantial differences between the 11-item scale and the two established self-affirmation manipulations (i.e., essay affirmation, 32-item scale) in terms of whether the task made participants think

about things that are positive and important to them, $F(2, 51) = 1.57$, $p = .401$, $\eta^2 = .035$, message derogation, $F(2, 51) = 2.15$, $p = .127$, $\eta^2 = .078$, message skepticism, $F(2, 51) = 1.64$, $p = .205$, $\eta^2 = .061$, perceived manipulation, $F(2, 51) = 1.04$, $p = .362$, $\eta^2 = .039$, perceived convincingness, $F(2, 51) = 2.91$, $p = .064$, $\eta^2 = .102$, perceived pleasantness, $F(2, 51) = .770$, $p = .468$, $\eta^2 = .029$, or perceived relevance, $F(2, 51) = .83$, $p = .442$, $\eta^2 = .032$.

Moreover, there were statistically significant differences between the 11-item self-affirmation scale and the control task in terms of whether the task made participants think about things that are positive and important to them, $F(1, 33) = 16.05$, $p = .000$, $\eta^2 = .327$ and perceived convincingness, $F(1, 33) = 6.99$, $p = .012$, $\eta^2 = .175$. Although these two conditions' differences were not statistically significantly different on message derogation ($F(1, 33) = 1.33$, $p = .258$, $\eta^2 = .039$), message skepticism ($F(1, 33) = .27$, $p = .609$, $\eta^2 = .008$), and perceived manipulation ($F(1, 33) = 1.63$, $p = .211$, $\eta^2 = .047$), the mean differences were in the anticipated direction (See *Table 4.4*). The two conditions did not differ on perceived pleasantness ($F(1, 33) = .044$, $p = .835$, $\eta^2 = .001$) or perceived relevance ($F(1, 33) = .009$, $p = .924$, $\eta^2 = .000$).

In conclusion, Pilot A showed that the length of the 32-item Napper et al. (2009) self-affirmation scale may interfere with message effects in the affirm-after-message condition. I thus created an 11-item version of the Napper et al. scale through Pilot B and confirmed in Pilot C that the 11-item scale can achieve comparable self-affirmation effects as the original 32-item scale and the essay affirmation task.

Table 4.4 Comparing Self-affirmation Tasks on Message Effects Outcomes: *M* (*SE*)

	11-item scale	32-item scale	Essay affirm	Random 11-item	Control
Manipulation check	5.32 (0.28)	5.33 (0.27)	5.77 (0.29)	5.05 (0.26)	3.86 (0.29)
Message skepticism	3.67 (0.48)	3.53 (0.46)	2.56 (0.51)	3.90 (0.45)	4.00 (0.49)
Message derogation	3.86 (0.40)	4.34 (0.39)	3.11 (0.43)	4.36 (0.38)	4.49 (0.41)
Perceived manipulation	4.03 (0.36)	3.87 (0.36)	3.73 (0.40)	4.03 (0.36)	3.77 (0.39)
Perceived convincingness	5.49 (0.28)	4.86 (0.27)	5.67 (0.30)	4.59 (0.26)	4.66 (0.29)
Perceived pleasantness	3.67 (0.38)	3.37 (0.37)	3.94 (0.40)	3.73 (0.36)	3.77 (0.39)
Perceived relevance	4.89 (0.49)	4.05 (0.47)	4.56 (0.51)	3.75 (0.46)	4.94 (0.50)

Main Study Method

Participants

A week before the main study, a screening survey was launched on Amazon Mechanical Turk to recruit participants for the main study. The inclusion criteria for the main study was that participants had to be U.S. adults whose alcohol consumption exceed the recommended levels in USDA dietary guidelines on moderate and low-risk drinking (i.e., up to 2 drinks a day for men 65 or younger, up to 1 drink a day for women of all ages and men over 65; “Appendix 9. Alcohol,” n.d.). Also, participation were limited to those who have completed less than 500 MTurk tasks and have received at least 95% approval rating for all previous tasks. This is to exclude professional survey takers and to exclude people who do not pay attention to the tasks. This screening survey included

measures of alcohol consumption, self-esteem, spontaneous self-affirmation tendency, and demographics.

To measure current alcohol consumption, participants were first provided with examples of one drink according to the definition from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (e.g., "By a drink we mean half an ounce of absolute alcohol. Examples of one drink: A 12-ounce can or glass of beer (about 5% alcohol), OR a 5-ounce glass of table wine (about 12% alcohol), OR […] one shot (1.5 ounces) of 80-proof distilled spirits (rum, vodka, whiskey, etc.; about 40% alcohol)"). Then, participants answered four alcohol consumption questions adapted from NIAAA ("Recommended alcohol questions," n.d.). The first question asked, "During the last 12 months, how often did you usually have any kind of drink containing alcohol?" (11 options; from "Every day" to "I never drank any alcohol in my life"). Participants who answered "I did not drink any alcohol in the last 12 months" or "I never drank any alcohol in my life" were excluded from answering later questions about alcohol consumption. The second question asked, "During the last 12 months, on a typical day when you drank alcohol, how many drinks did you have?" (10 options range from "25 or more drinks" to "1 drink"). Participants' responses were compared to USDA dietary guidelines on moderate and low-risk drinking. Those who typically drink more than the moderate and low-risk drinking level were considered as eligible for the main study. The third question asked about the maximum number of drinks one had within a 24-hour period during last 12 months and the last question asked about the frequency of binge

drinking behavior (i.e., 5 or more drinks for men or 4 or more drinks for women in about two hours; "Drinking levels defined," n.d.) during last 12 months.

A total of 1061 U.S. adults completed the screening survey and 555 participants[3] who met the inclusion criteria were sent an email invitation to participate in the main study a week after. Among the participants invited, 427 of them participated in the main study (retention rate: 76.9%). One participant was removed because the person did not pay attention to instructions before responding. This was indicated by the person completing the study in less than five minutes and failing three attention check questions. The ages of remaining participants ranged from 18 to 76 years with an average age of 33.04 (Median = 30; *SD* = 11.15). 66.9% of participants were female (*n* = 285). A total of 78.6% of participants were White (*n* = 335), 8% were Black (*n* = 34), 4.2% were Asian (*n* = 18), 4% were Hispanic/Latino (*n* = 17), and 5.2% were multiracial or other (*n* = 22) (See *Appendix A.3* for sample characteristics).

Design and Procedure

A 3 (Self-affirmation task: essay affirmation, scale affirmation, no affirmation) by 2 (Timing of self-affirmation: affirm before message exposure, affirm after message exposure) plus 1 (message only) between-subjects experiment was conducted online. The message only condition was included to establish baseline responses to the health

[3] Because there was no previous research of the same topic based on which I can estimate the effect size, it was impossible to conduct a priori power analysis to estimate the sample size needed. Therefore, I intentionally oversampled based on the experimental design to ensure that the analyses would have sufficient statistical power. Because the independent variable self-esteem was measured rather than experimentally manipulated, I aimed for having about 80 participants per experimental condition.

message (i.e., responses to the message without the influences from the self-affirmation task or the control task). Participants were randomly assigned to one of the seven conditions. All participants had completed the Rosenberg Self-esteem (1965) scale a week before the main study.

Participants in the essay affirmation condition were asked to write a short essay about their most important value, why it is important to them, and how they have used it in life (Harris & Napper, 2005). Participants in the scale self-affirmation condition completed the shortened version of the Napper et al. (2009) self-affirmation scale that was created in pilot B. However, because of a programming error, instead of all 11 items, these participants were displayed 10 items randomly selected from the shortened self-affirmation scale. Nonetheless, it is unlikely that missing one item would render the outcomes of this self-affirmation task drastically different from that of the 11-item scale. Participants in the control condition were asked to write about the shops and buildings they saw on a route that they traveled regularly (Napper, Harris, & Epton, 2009).

The timing of self-affirmation was manipulated in the same way as in pilot A. In the affirm-before-message condition, participants completed the self-affirmation/control task before reading a health message. In the affirm-after-message condition, participants read the health message first and then completed the self-affirmation/control task. Last, participants filled out a questionnaire that included measures of our key variables of interest.

Stimuli

To develop stimuli for study 3, information from NIAAA was used to create contents for a health message about limiting alcohol consumption. The message contained information about the harmful impacts of excessive drinking on heart health, the recommended level of alcohol consumption for men and women of different ages, and a sentence recommending people to limit drinking to the moderate level. Aesthetic elements were added to make the message look like a real health message that people may see in the media environment.

A pilot test was conducted with 34 U.S. adults recruited from the Amazon Mechanical Turk panel to examine whether the messages can successfully induce defensiveness among people whose alcohol consumption exceeds the recommended level. Participants first answered questions about their current alcohol consumption. Next, they read the message and answered questions about their current mood, perceived risk of heart disease due to excessive drinking, message derogation, perceived manipulation, and message skepticism. Compared to participants whose alcohol consumption does not exceed the recommended level, participants whose alcohol consumptions exceed the recommended level (n = 15) reported less positive mood ($F(2, 31) = 4.48$, $p = .042$, $\eta^2 = .126$), lower perceived heart disease risk due to excessive drinking ($F(2, 31) = 8.33$, $p = .007$, $\eta^2 = .212$), higher message derogation ($F(2, 31) = 4.41$, $p = .044$, $\eta^2 = .125$), and higher message skepticism ($F(2, 31) = 4.71$, $p = .038$, $\eta^2 =$

.132; See *Table 4.5*). Therefore, the message was used in study 3 unchanged (See *Figure 4.2* for the message).

Table 4.5 Message Effects between Light and Excessive Drinkers: *M* (*SE*)

	Light Drinkers	Excessive Drinkers
Mood (1 = Negative – 7 = Positive)	5.95 (0.22)	5.17 (0.30)
Perceived personal heart disease risk due to excessive drinking	5.86 (0.23)	4.75 (0.31)
Message derogation	2.20 (0.32)	3.31 (0.42)
Message skepticism	2.14 (0.35)	3.42 (0.47)

Figure 4.2 Anti-excessive drinking message

Key Measures

Self-esteem was measured with the Rosenberg self-esteem scale (1965). Participants responded to ten 7-point scale items, such as "On the whole, I am satisfied with myself," "I feel that I'm a person of worth, at least on an equal plane with others," and "I wish I could have more respect for myself" (1 = "Strongly disagree" – 7 = "Strongly agree"). Five items were reverse scored. Participants' average scores of the ten items were used as the indicator of self-esteem (α = .924, *M* = 4.98, *SD* = 1.21).

Indicators of Defensive Processing

Psychological Discomfort. As discussed in Study 1, the question stem of the original psychological discomfort measure ("How are you feeling right now?") assessed the psychological state *after* message exposure rather than the psychological state *during* message exposure. To capture the psychological state during message exposure, in this study I changed the stem to "[…] how did you feel while reading the message?" The three 7-point scale items from Elliot and Devine (1994), "I feel uncomfortable," "I feel uneasy," and "I feel bothered," were used (1 = "None of this feeling" – 7 = "A great deal of this feeling"). The mean of the three items was used as the composite score for psychological discomfort (α = .87, *M* = 2.21, *SD* = 1.39).

Anger was measured with two 7-point scale items "I felt annoyed" and "I felt angry" (1 = "None of this feeling" – 7 = "A great deal of this feeling"). The mean of the two items was used as the composite score for anger (*r* = .562, *M* = 1.75, *SD* = 1.09).

To reduce experimental demand concerns, I included additional items to measure self-directed negative emotions ("I felt disappointed with myself" and "I felt guilty"; r = .820; M = 2.28, SD = 1.56), self-directed positive emotions ("I felt confident" and "I felt good about myself"; r = .649; M = 3.83, SD = 1.82), and anxiety ("I felt anxious"; M = 2.18, SD = 1.49).

Message skepticism was measured with the 7-point scale item "While reading the message, I was skeptical of what was being said" (1 = "Strongly disagree" – 7 = "Strongly agree"; M = 2.96, SD = 1.62).

Message derogation was measured with four 7-point scale items adapted from Witte (1994): "The information in the message was exaggerated," "The information in the message was distorted," "The information in the message was overstated," and "The information in the message was overblown" (1 = "Strongly disagree" – 7 = "Strongly agree"). The mean of the four items was used as the composite score for message derogation (α = .938, M = 2.79, SD = 1.34).

Perceived manipulation was measured with three 7-point scale items adapted from Witte (1994): "The message made me feel manipulated," "The message made me feel exploited," and "The message deliberately tried to manipulate my feelings" (1 = "Strongly disagree" – 7 = "Strongly agree"). The mean of the three items was used as the composite score for perceived manipulation (α = .824, M = 2.65, SD = 1.21).

A measure of perceived personal risk of heart disease due to excessive drinking was added to triangulate the results from the above indicators of defensiveness. People

who engaged in defensive processing of the health message may use denying personal risk as a way to reduce the threat to the self. A high level of perceived personal risk indicates that the person is willing to acknowledge one's vulnerability to the health risk thus reflecting low defensiveness. In contrast, a low level of perceived personal risk indicates that the person is unwilling to acknowledge one's vulnerability to the health risk thus reflecting high defensiveness. **Perceived personal risk of heart disease due to excessive drinking** was measured with the question "How likely do you think drinking more than the moderate amount of alcohol will increase your chance of developing heart disease?" (1 = "Very unlikely" – 7 = "Very likely"; M = 5.24, SD = 1.56).

Indicators of Message Acceptance

A 7-item bipolar semantic differential scale (1 – 7) adopted from Yzer et al., (2011) was used to measure message acceptance. The stem phrase "To me, the message was:" was anchored with seven word pairs. The first four items, "extremely unconvincing – extremely convincing," "extremely unbelievable – extremely believable," "extremely forgettable – extremely memorable," and "extremely bad – extremely good," measured **perceived convincingness** (α = .759, M = 5.23, SD = 1.18). The fifth and sixth items, "extremely unpleasant – extremely pleasant" and "extremely negative – extremely positive" measured **perceived pleasantness** (r = .598, M = 3.89, SD = 1.50). The last item, "extremely not meant for someone like me – extremely meant for someone like me," measured **perceived relevance** (M = 4.12, SD = 2.00).

Attitude and Intentions regarding Limiting Alcohol Consumption

Ten 7-point bipolar semantic differential items were used to measure **attitude**: "You limiting the amount of alcohol you drink to the moderate level on the days you drink would be: "unpleasant-pleasant", "unenjoyable-enjoyable", "stressful-relaxing", "negative-positive", "bad-good", "harmful-beneficial", "foolish-wise" and "unnecessary-necessary." Participants' average scores of the ten items were used as the indicator of attitude towards daily flossing ($\alpha = .901$; $M = 5.21$, $SD = 1.19$).

Four 7-point scale items were used to measure **intention to limit alcohol consumption**: "How likely is it that you will limit the amount of alcohol you drink to the moderate level on the days you drink? (1 = very unlikely, 7 = very likely)", "I can see myself limiting the amount of alcohol I drink to the moderate level on the days I drink," "I will limit the amount of alcohol I drink to the moderate level on the days I drink," and "I intend to limit the amount of alcohol I drink to the moderate level on the days I drink" (1 = "Strongly disagree" – 7 = "Strongly agree"). The average score of the four items was used as the overall measure of intention ($\alpha = .96$; $M = 4.74$ $SD = 1.76$).

Three additional intention measures with time frames were used to examine whether people's intentions to limit alcohol consumption to the moderate level would differ when a specific temporal context is added. **Intention to limit alcohol consumption in the following month** was measured by a 7-point scale item – "In the following month, how likely is it that you will limit the amount of alcohol you drink to the moderate level on the days you drink?" (1 = "Very unlikely" – 7 = "Very likely"; $M =$

4.87, *SD* = 1.91). **Intention to limit alcohol consumption in the next 3 months** was measured by a 7-point scale item – "In the next 3 months, how likely is it that you will limit the amount of alcohol you drink to the moderate level on the days you drink?" (1 = "Very unlikely" – 7 = "Very likely"; *M* = 4.82, *SD* = 1.87). **Intention to limit alcohol consumption in next 12 months** was measured by a 7-point scale item – "In the next 12 months, how likely is it that you will limit the amount of alcohol you drink to the moderate level on the days you drink?" (1 = "Very unlikely" – 7 = "Very likely"; *M* = 4.77, *SD* = 1.88).

Control Variables

Similar to Study 2, a week before the main study, participants' **spontaneous self-affirmation tendency** was measured with two 7-point scale items developed by Harris et al. (2011): "When I feel threatened or anxious I find myself thinking about my strengths" and "When I feel threatened or anxious I find myself thinking about what I stand for" (1 = "Strongly disagree" – 7 = "Strongly agree"; *r* = .612, *M* = 4.4, *SD* = 1.39). To determine whether it would be useful to control spontaneous self-affirmation tendency in the analyses, I examined the correlations between spontaneous self-affirmation tendency and the dependent variables within each experimental condition. Because spontaneous self-affirmation tendency was correlated with all dependent variables except intention to reduce alcohol consumption in next three months (See *Table 4.6*), it was included as a control variable in analyses on all dependent variables except intention to reduce alcohol consumption in next three months.

Regardless of self-affirmation manipulation, people who currently consume higher amount of alcohol would report higher defensiveness, lower message acceptance, and less favorable attitude and lower intention regarding the recommended behavior because the health message challenges their current position on the behavior. Therefore, I also included current alcohol consumption as an intended control variable. I measured participants' **current alcohol consumption** a week before the main study with the question "During the last 12 months, on a typical day when you drank alcohol, how many drinks did you have?" (10 options; ranging from "25 or more drinks" to "1 drink"). I examined current alcohol consumption's correlations with each dependent variable within each experimental condition to determine whether it is useful to include it as a control variable. Because current alcohol consumption was correlated with all dependent variables except perceived personal heart disease risk, perceived convincingness, and perceived pleasantness (See *Table 4.7*), it was entered as a control variable in analyses on all dependent variables except the abovementioned three.

Table 4.6 Bivariate Correlations between Spontaneous Self-Affirmation Tendency and Dependent and Independent Variables by Experimental Condition

	Control		Essay Affirm		Scale Affirm		Message Only
Timing	Before	After	Before	After	Before	After	
Self-esteem	.17	.42**	.34*	.26*	.39*	.34**	.35**
Discomfort	.10	-.05	.10	-.22†	-.05	.30*	.25*
Anger	-.01	-.09	.12	-.22†	.06	.13	.17
Skepticism	.02	-.09	.07	-.26*	.04	.04	.04
Derogation	-.05	.01	.07	-.29*	-.07	-.05	-.05

Perc. Manipul.	.09	.01	.12	-.28*	.17	.01	-.01
Perc. Risk	-.08	.11	.01	.13	.07	.32*	.01
Perc. Conv.	.08	.28*	-.01	.31*	.02	.26*	.06
Perc. Plea.	.16	.22	.18	.24†	-.08	.14	.03
Perc. Relev.	-.01	.08	.05	.05	.02	.34**	.16
Attitude	.12	.44**	-.12	.17	-.05	.00	.05
Intention	.05	.30*	-.20	.13	-.02	.02	.05
Int (Nxt Wk)	.07	.27*	-.14	.25†	.06	.03	.01
Int (Nxt 3 Mo)	.07	.20	-.19	.19	-.10	-.02	.04
Int (Nxt 12 Mo)	.13	.20	-.23†	.21	.09	-.09	.13

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manipul. refers to perceived manipulation. Perc. Risk refers to perceived personal heart disease risk due to excessive drinking. Perc. Conv. refers to perceived convincingness. Perc. Plea. refers to perceived pleasantness. Perc. Relev. refers to perceived relevance. Int refers to Intention.

Table 4.7 Bivariate Correlations between Current Alcohol Consumption and Dependent and Independent Variables by Experimental Condition

	Control		Essay Affirm		Scale Affirm		Message Only
Timing	Before	After	Before	After	Before	After	
Self-esteem	.04	-.09	-.09	.02	-.17	.04	-.27*
Discomfort	.14	.20	.32*	.29*	.26*	.25*	.42***
Anger	.05	-.01	.13	.17	.39**	.28*	.42***
Skepticism	.09	-.20	.01	.04	-.14	.08	.24*
Derogation	.07	-.13	.11	.02	-.03	.14	.22†
Perc. Manipul.	.00	-.07	.20	.05	.13	.18	.34**
Perc. Risk	-.18	-.01	-.15	-.02	.07	.08	.06
Perc. Conv.	-.15	.12	-.06	.07	-.10	.00	-.13
Perc. Plea.	-.15	-.01	-.06	-.10	-.10	-.14	.06
Perc. Relev.	.23†	.20	.10	.08	.07	.16	.14
Attitude	-.29*	-.07	.05	-.02	.00	.01	-.07

Intention	-.24†	-.14	-.18	-.02	-.06	.00	-.26*
Int (Nxt Wk)	-.13	-.11	-.19	-.06	-.04	.00	-.25*
Int (Nxt 3 Mo)	-.24†	-.21	-.18	-.02	.02	-.01	-.20†
Int (Nxt 12 Mo)	-.25†	-.23†	-.07	.01	.06	.03	-.21†

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manipul. refers to perceived manipulation. Perc. Risk refers to perceived personal heart disease risk due to excessive drinking. Perc. Conv. refers to perceived convincingness. Perc. Plea. refers to perceived pleasantness. Perc. Relev. refers to perceived relevance. Int. refers to Intention.

Results

Data Analysis Strategy

It was hypothesized that affirming the most important value (i.e., Essay affirmation) *before* message exposure decreases the defensive responses toward the personally relevant health message and increases message acceptance, attitude, and intention among people with LSE but not among people with HSE. In addition, affirming the most important value *after* message exposure was thought to increase the defensive responses toward the health message and decrease message acceptance, attitude, and intention among people with HSE, but less so among people with LSE. To test the hypotheses, the responses of participants with HSE and LSE in the **essay affirmation** *before* and *after* message exposure conditions were compared with the responses of those in the message only condition.

Moreover, it was hypothesized that affirming a range of values (i.e., Scale affirmation) *before* message exposure decreases the defensive responses toward the health message and increases message acceptance, attitude, and intention among people with HSE while increases the defensive responses toward the health message and decreases message acceptance, attitude, and intention among people with LSE. However, affirming a range of values *after* message exposure was expected to increase defensive responses toward the health message and decrease message acceptance, attitude, and intention among people with HSE, but not among people with LSE. To test the hypotheses, the responses of participants with HSE and LSE in the **scale affirmation** *before* and *after* message exposure conditions were compared with the responses of those in the message only condition.

To rule out the possibility that the expected effects are due to people completing irrelevant tasks before or after health message exposure rather than because of self-affirmation manipulations, the responses of participants with HSE and LSE in the two **control task** conditions are compared with the responses of those in the message only condition. It was expected that compared to participants with HSE or LSE who only read the health message, participants with HSE or LSE who completed a control task *before* or *after* message exposure would not differ in their defensiveness toward the message, their message acceptance, or their attitude or intentions regarding limiting alcohol consumption to the moderate level.

Six dummy-coded condition variables were constructed to represent the six self-affirmation x timing experimental conditions (i.e., Essay Affirm Before, Essay Affirm After, Scale Affirm Before, Scale Affirm After, Control Task Before, and Control Task After; See *Table 4.8*). The message only condition was used as a reference group and thus was coded as "0" in all six condition variables. Six two-way interaction terms were built by multiplying self-esteem with each condition variable (i.e., Self-esteem x Essay Affirm Before, Self-esteem x Essay Affirm After, Self-esteem x Scale Affirm Before, Self-esteem x Scale Affirm After, Self-esteem x Control Task Before, Self-esteem x Control Task After).

Table 4.8 Dummy Coded Self-affirmation and Timing Condition Variables

	Dummy-coding of condition variables					
Conditions	Essay Affirm Before	Essay Affirm After	Scale Affirm Before	Scale Affirm After	Control Task Before	Control Task After
Essay affirmation before message exposure	1	0	0	0	0	0
Essay affirmation after message exposure	0	1	0	0	0	0
Scale affirmation before message exposure	0	0	1	0	0	0
Scale affirmation after message exposure	0	0	0	1	0	0
Control task before message exposure	0	0	0	0	1	0
Control task after message exposure	0	0	0	0	0	1
Message only	0	0	0	0	0	0

Three sets of hierarchical regression analyses were conducted. Indicators of defensiveness, message acceptance, attitude, and intention toward limiting alcohol consumption were used as the dependent variables. The first set of analyses used data from the two essay affirmation conditions (i.e., Essay Affirm Before, Essay Affirm After) and the message only condition to test the interaction effects between self-esteem and essay affirmation x timing conditions. The second set of analyses used data from the two scale affirmation conditions (i.e., Scale Affirm Before, Scale Affirm After) and the message only condition to test the interaction effects between self-esteem and scale affirmation x timing conditions. The third set of analyses used data from the two control conditions (i.e., Control Task Before, Control Task After) and the message only condition to test the interaction effects between self-esteem and control task x timing conditions.

For analyses of ***psychological discomfort***, ***anger***, ***message skepticism***, ***message derogation***, ***perceived manipulation***, ***perceived relevance***, ***alcohol consumption reduction attitude***, ***alcohol consumption reduction intention***, ***alcohol consumption reduction intention in next month***, and ***alcohol consumption reduction intention in next 12 months***, the mean-centered current alcohol consumption and mean-centered spontaneous self-affirmation tendency were entered at step 1 as control variables. The dummy-coded condition variables and the mean-centered self-esteem were entered at step 2 as independent variables and the two-way interaction terms were entered at step 3.

For analyses of ***alcohol consumption reduction intention in next three months***, mean-centered current alcohol consumption was entered as a control variable at step 1.

The dummy-coded condition variables and the mean-centered self-esteem were entered as independent variables at step 2 and the two-way interaction terms were entered at step 3.

For analyses of ***perceived personal heart disease risk***, ***perceived convincingness***, and ***perceived pleasantness***, mean-centered spontaneous self-affirmation tendency was entered as a control variable at step 1. The dummy-coded condition variables and the mean-centered self-esteem were entered as independent variables at step 2 and the two-way interaction terms were entered at step 3.

The proposed effects would be indicated by interactions between the condition variables and self-esteem. An interaction between ***Essay Affirm Before and self-esteem*** means that completing an essay affirmation task before message exposure has different effects for people with HSE and LSE, and an interaction between ***Essay Affirm After and self-esteem*** means that completing an essay affirmation task after message exposure has different effects for people with HSE and LSE.

Similarly, an interaction between ***Scale Affirm Before and self-esteem*** means that completing a scale affirmation task before message exposure has different effects for people with HSE and LSE, and an interaction between ***Scale Affirm After and self-esteem*** means that completing a scale affirmation task after message exposure has different effects for people with HSE and LSE.

Last, an interaction between ***Control Task Before and self-esteem*** means that completing a control task before message exposure has different effects for people with

HSE and LSE, and an interaction between ***Control Task After and self-esteem*** means that completing a control task after message exposure has different effects for people with HSE and LSE.

Descriptive Statistics

The bivariate correlations and descriptive statistics of dependent and independent variables are reported in *Table 4.9* to *Table 4.12.*

Table 4.9 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables (N = 426)

Self-esteem: *M* (*SD*) = 4.98 (1.21)

Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Defensiveness***						
	Discomfort	Anger	Skepticism	Derogation	Perc. Manip.	Perc. Risk.
Essay Aff Bef	-.02	.03	-.06	-.03	-.08	-.01
Essay Aff Aft	-.06	-.05	-.05	.02	-.05	.08
Scale Aff Bef	.04	-.07	-.13*	-.13*	.01	.01
Scale Aff Aft	.00	-.04	.00	-.01	.03	-.04
Ctrl Task Bef	.04	.09†	.05	.06	.04	-.04
Ctrl Task Aft	-.02	-.03	.07	.07	.05	.01
Self-esteem	-.12*	-.09†	-.06	-.06	-.01	.10*
M (*SD*)	2.21 (1.39)	1.75 (1.09)	2.96 (1.62)	2.79 (1.34)	2.65 (1.21)	5.24 (1.56)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manip. refers to Perceived Manipulation.

Table 4.10 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables (N = 426)

Self-esteem: *M* (*SD*) = 4.98 (1.21)			
Correlations between Self-Affirmation, Self-Esteem, and ***Indicators of Message Acceptance***			
	Perc. Conv.	Perc. Pleas.	Perc. Relev.
Essay Aff Bef	.01	.06	-.06
Essay Aff Aft	.03	.03	-.06
Scale Aff Bef	.06	-.09†	-.01
Scale Aff Aft	.00	.05	.12†
Ctrl Task Bef	-.07	-.04	-.02
Ctrl Task Aft	-.01	.01	.00
Self-esteem	.10*	.11*	.04
M (*SD*)	5.23 (1.18)	3.89 (1.50)	4.12 (2.00)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance.

Table 4.11 Bivariate Correlations and Descriptive Statistics of Independent and Dependent Variables (N = 426)

Self-esteem: *M* (*SD*) = 4.98 (1.21)

Correlations between Self-Affirmation, Self-Esteem, and ***Measures of Attitude and Intention***					
	Attitude	Intention	Int. (Next mo.)	Int. (Next 3 mo.)	Int. (Next 12 mo.)
Essay Aff Bef	.02	.00	.02	-.02	-.01
Essay Aff Aft	.02	.02	.02	.04	.02
Scale Aff Bef	.06	.11*	.06	.10†	.09†
Scale Aff Aft	.01	-.03	.00	.00	-.01
Ctrl Task Bef	-.08	-.04	-.03	-.03	-.02
Ctrl Task Aft	.00	-.02	.02	-.03	-.03
Self-esteem	.06	.10*	.05	.01	.02
M (*SD*)	5.21 (1.19)	4.74 (1.76)	4.87 (1.91)	4.82 (1.87)	4.77 (1.88)

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Int. refers to Intention.

Table 4.12 Bivariate Correlations between Dependent Variables (N = 426)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Discomfort	-												
2. Anger	.57***	-											
3. Skepticism	.12*	.22***	-										
4. Derogation	.11*	.24***	.80***	-									
5. Perc. Manip.	.24***	.34***	.60***	.71***	-								
6. Perc. Risk	.08	-.10*	-.38***	-.41***	-.27***	-							
7. Perc. Conv.	-.09†	-.22***	-.57***	-.61***	-.54***	47***	-						
8. Perc. Pleas.	-.36***	-.18***	-.23***	-.24***	-.33***	.13**	.44***	-					
9. Perc. Relev.	.32***	.06	-.07	-.12*	-.02	.22***	.20***	-.08	-				
10. Attitude	-.03	-.13**	-.39***	-.37***	-.31***	.29**	.48***	.29***	.03	-			
11. Intention	-.16**	-.14**	-.38***	-.33***	-.24***	.21***	.35***	.28***	-.18***	.65***	-		
12. Int (1 mo)	-.18***	-.16**	-.37***	-.31***	-.24***	.23***	.37***	.26***	-.14**	.60***	.87***	-	
13. Int (3 mo)	-.15**	-.12*	-.37***	-.32***	-.25***	.26***	.36***	.24***	-.14**	.65***	.88***	.90***	-
14. Int (12 mo)	-.13**	-.11*	-.37***	-.33***	-.23***	.26***	.35***	.24***	-.13**	.64***	.84***	.82***	.93***

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manip. refers to Perceived Manipulation. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int refers to Intention.

Outline of Results

Overall, regression analyses revealed interactions between self-esteem and self-affirmation manipulations on psychological discomfort, message skepticism, perceived personal heart disease risk, perceived convincingness, and perceived pleasantness (See *Table 4.13*).

Given the complexity of the research design, I will present the results in three sections: (1) effects of affirming the most important value before or after message exposure, (2) effects of affirming a range of values before or after message exposure, and (3) effects of completing a control task before or after message exposure. In each of the three sections, I will present the results in three groups based on the category of the dependent variable, namely, (1) effects on indicators of defensiveness, (1) effects on indicators of message acceptance, and (3) effects on attitude and intention. Next, supplemental analyses will be provided to aid further understanding the findings.

Table 4.13 Outline of Study 3 Results

Effects of affirming the most important value *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects
Indicators of Defensiveness	Discomfort	Essay Aff Aft x SE	-
	Anger	-	Essay Aff Aft (-)
	Skepticism	Essay Aff Aft x SE	Essay Aff Bef (-)
	Derogation	-	-
	Perc. Manip.	-	-
	Perc. Risk	Essay Aff Bef x SE Essay Aff Aft x SE	-

Indicators of Message Acceptance	Perc. Conv.	Essay Aff Bef x SE Essay Aff Aft x SE	-
	Perc. Pleas.	Essay Aff Aft x SE	-
	Perc. Relev.	-	-
Attitude and Intention Measures	Attitude	-	-
	Intention	-	-
	Int (Next mo)	-	-
	Int (Next 3 mo)	-	-
	Int (Next 12 mo)	-	-
Effects of affirming a range of values *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects
Indicators of Defensiveness	Discomfort	-	-
	Anger	-	Scale Aff Bef (-) Scale Aff Aft (-)
	Skepticism	-	Scale Aff Bef (-)
	Derogation	-	Scale Aff Bef (-)
	Perc. Manip.	-	-
	Perc. Risk	Scale Aff Aft x SE	-
Indicators of Message Acceptance	Perc. Conv.	Scale Aff Bef x SE	-
	Perc. Pleas.	-	-
	Perc. Relev.	-	-
Attitude and Intention Measures	Attitude	-	-
	Intention	-	Scale Aff Bef (+)
	Int (Next mo)	-	Scale Aff Bef (+)
	Int (Next 3 mo)	-	Scale Aff Bef (+)
	Int (Next 12 mo)	-	-
Effects of completing a control task *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects

Indicators of Defensiveness	Discomfort	Ctrl Task Bef x SE	-
	Anger	-	-
	Skepticism	-	-
	Derogation	-	-
	Perc. Manip.	-	-
	Perc. Risk	Ctrl Task Aft x SE	-
Indicators of Message Acceptance	Perc. Conv.	Ctrl Task Aft x SE	-
	Perc. Pleas.	-	-
	Perc. Relev.	-	-
Attitude and Intention Measures	Attitude	-	-
	Intention	-	-
	Int (Next mo)	-	-
	Int (Next 3 mo)	-	-
	Int (Next 12 mo)	-	-

Note. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manip. refers to Perceived Manipulation. Perc. Risk refers to Perceived Personal Heart Disease Risk due to Excessive Drinking. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int refers to Intention.

1. Effects of <u>Affirming the Most Important Value</u> before or after Message Exposure

Effects on Indicators of Defensiveness

Psychological Discomfort. The regression analysis demonstrated an interaction on psychological discomfort between ***Essay Affirm After and self-esteem***, $\Delta R^2_{\text{Step3}}$ = .050, b = -.646, $t(184)$ = -3.26, p = .001 (See *Table 4.14* for regression analysis results),

but not between Essay Affirm Before and self-esteem. Simple slope analyses showed that among participants with HSE (+1SD), completing an essay affirmation task after message exposure had a negative effect on psychological discomfort, b = -.999, t(184) = -3.23, p = .001. Although the slope for participants with LSE (-1SD) was not statistically significantly different from zero, b = .523, t(184) = 1.58, p = .115, it was sufficiently higher than the slope for participants with HSE (Z = 3.36, p = .000, one tailed).

Contrary to the hypothesis, people with HSE (+1SD) who affirmed their most important value after message exposure (i.e., Essay Affirm After) expressed lower levels of psychological discomfort than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed their most important value after message exposure expressed higher levels of psychological discomfort than their counterparts who only read the message (See *Figure 4.3*).

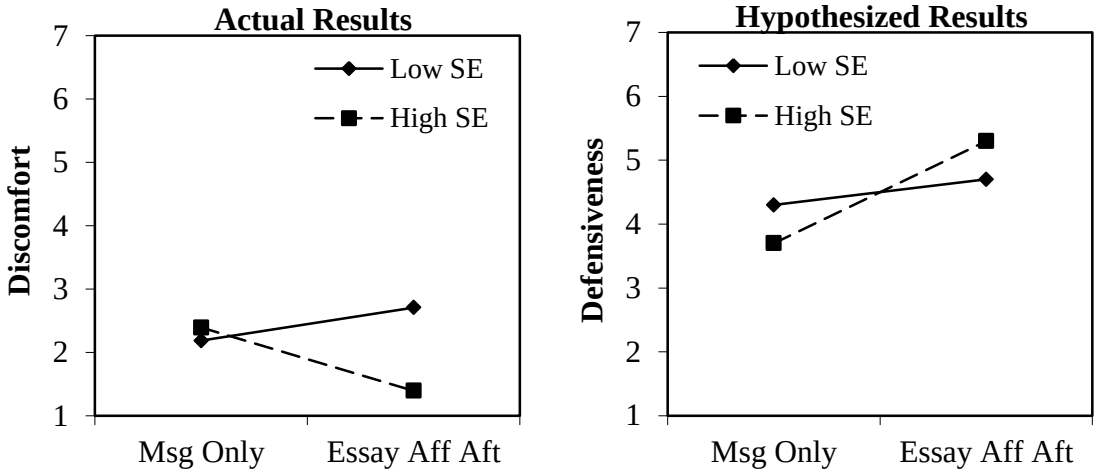


Figure 4.3 Essay Affirm After x self-esteem effect on psychological discomfort

Left: Predicted values for psychological discomfort among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for defensiveness among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Anger. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found on anger. At step 2 of the regression analysis, there was a main effect of ***Essay Affirm After***, $\Delta R^2_{\text{Step2}} = .018$, $b = -.333$, $t(186) = -1.73$, $p = .085$ (See *Table 4.14* for regression analysis results). Participants who affirmed their most important value after message exposure (i.e., Essay Affirm After) reported lower levels of anger than participants who only read the message, regardless of their self-esteem levels.

Message Skepticism. The regression analysis demonstrated an interaction on message skepticism between ***Essay Affirm After and self-esteem*** ($\Delta R^2_{\text{Step3}} = .024$, $b = -.519$, $t(184) = -2.05$, $p = .042$) but not between Essay Affirm Before and self-esteem (See *Table 4.14* for regression analyses results). Simple slope analyses showed that among participants with HSE (+1SD), completing an essay affirmation task after message exposure had a negative effect on message skepticism, $b = -1.14$, $t(184) = -2.88$, $p = .004$. Among participants with LSE (-1SD), completing an essay affirmation task after message exposure had no effect on message skepticism, $b = .084$, $t(184) = .198$, $p = .843$.

Contrary to the hypothesis, people with HSE (+1SD) who affirmed their most important value after message exposure (i.e., Essay Affirm After) expressed lower levels of message skepticism than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed their most important value after message exposure showed no change on message skepticism compared with their counterparts who only read the message (See *Figure 4.4*).

Moreover, at step 2 of the regression analysis, there was a main effect of ***Essay Affirm Before***, $\Delta R^2_{Step2} = .036$, $b = -.623$, $t(186) = -2.18$, $p = .031$ (See *Table 4.14* for regression analysis results). Participants who affirmed their most important value before message exposure were less skeptical of the health message content than participants who only read the message, regardless of their self-esteem levels.

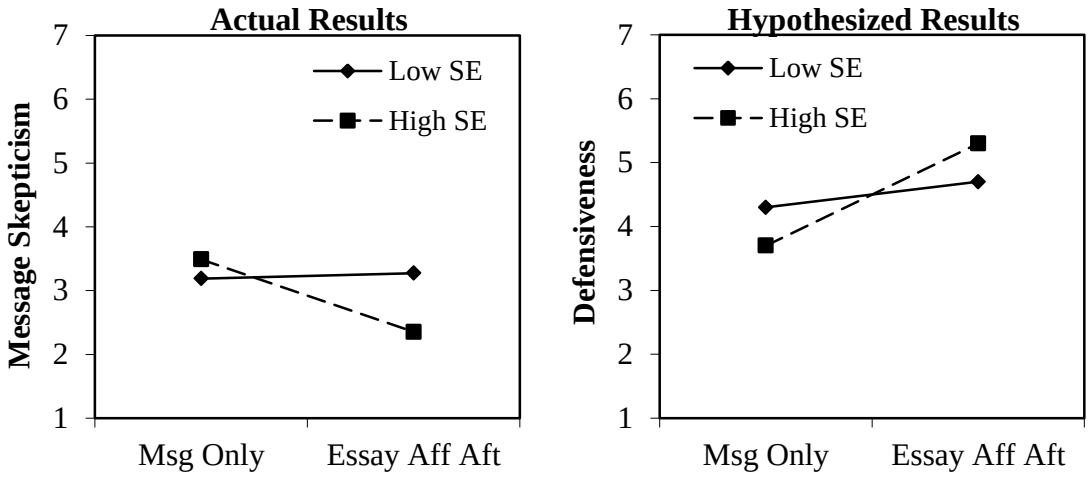


Figure 4.4 Essay Affirm After x self-esteem effect on message skepticism

Left: Predicted values for message skepticism among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for defensiveness among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Message Derogation. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found. There was no main effect of essay affirmation x timing conditions, either (See *Table 4.14* for regression analysis results).

Perceived Manipulation. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found on perceived manipulation. There was no main effect of essay affirmation x timing conditions, either (See *Table 4.14* for regression analysis results).

Perceived Personal Heart Disease Risk. The regression analysis demonstrated interactions on perceived personal heart disease risk due to excessive drinking between ***Essay Affirm Before and self-esteem*** (ΔR^2_{Step3} = .057, b = .392, t(185) = 1.78, p = .076) and between ***Essay Affirm After and self-esteem*** (b = .798, t(185) = 3.33, p = .001; See *Table 4.14* for regression analysis results).

Regarding the ***Essay Affirm Before and self-esteem*** interaction, simple slope analyses showed that the slope for participants with LSE (-1SD) and that for participants with HSE (+1SD) were not statistically significantly different from zero (b_{LSE} = -.514, t(184) = -1.41, p = .160; b_{HSE} = .409, t(185) = 1.06, p = .292). However, the slope for

participants with HSE was sufficiently higher than the slope for participants with LSE (Z = 1.74, p = .041, one tailed).

Contrary to the hypothesis, people with LSE (-1SD) who affirmed their most important value before message exposure (i.e., Essay Affirm Before) expressed lower levels of perceived personal risk than their counterparts who only read the message, while participants with HSE (+1SD) who affirmed their most important value before message exposure showed no change on perceived personal risk compared to their counterparts who only read the message (See *Figure 4.5*).

Regarding the ***Essay Affirm After and self-esteem*** interaction, simple slope analyses showed that among participants with LSE (-1SD), completing an essay affirmation task after message exposure had a negative effect on perceived personal risk, b = -1.211, t(185) = -3.00, p = .003, while among participants with HSE (+1SD), completing an essay affirmation task after message exposure had a positive effect on perceived personal risk, b = -.670, t(185) = 1.79, p = .075.

Contrary to the hypothesis, people with LSE (-1SD) who affirmed their most important value after message exposure (i.e., Essay Affirm After) expressed lower levels of perceived personal risk than their counterparts who only read the message, while participants with HSE (+1SD) who affirmed their most important value after message exposure expressed higher levels of perceived personal risk than their counterparts who only read the message (See *Figure 4.6*).

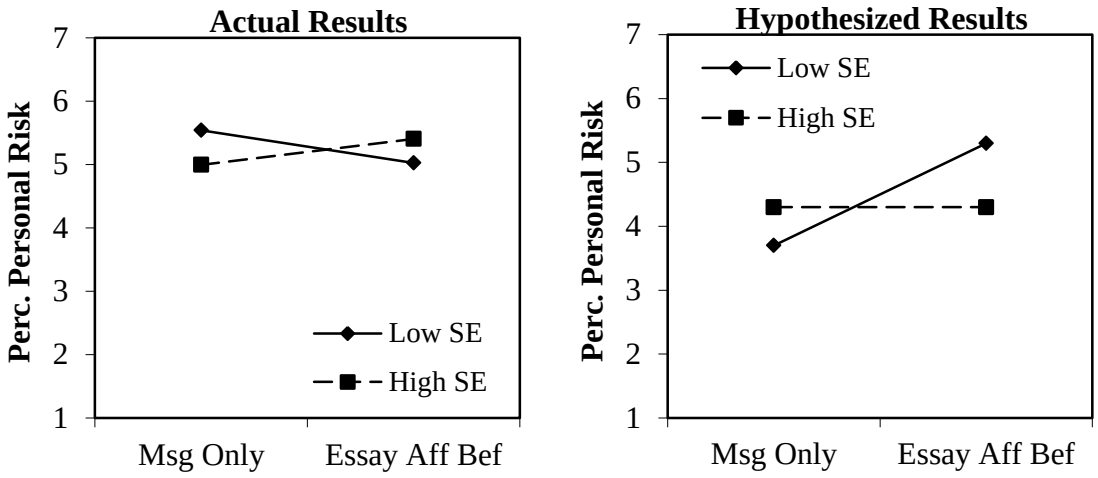


Figure 4.5 Essay Affirm Before x self-esteem effect on perceived personal heart disease risk due to excessive drinking

Left: Predicted values for perceived personal risk among participants in the Essay Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for perceived personal risk[4] among participants in the Essay Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

[4] Because the association between defensiveness and perceived personal risk is negative while that between defensiveness and other indicators in the study is positive, to make it easier to compare the observed and the hypothesized results of perceived personal risk, I provided separate figures for hypothesized results of perceived personal risk rather than using the ones that labeled as "defensiveness" which represent all other defensiveness indicators in the study.

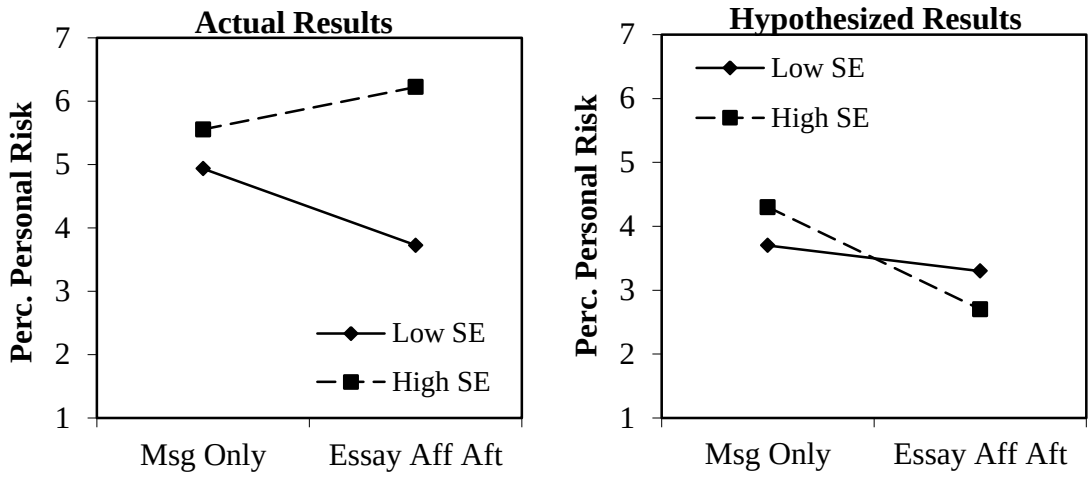


Figure 4.6 Essay Affirm After x self-esteem effect on perceived personal heart disease risk due to excessive drinking

Left: Predicted values for perceived personal risk among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for perceived personal risk among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Effects on Indicators of Message Acceptance

Perceived Convincingness. The regression analysis demonstrated interactions on perceived convincingness of message between ***Essay Affirm Before and self-esteem*** ($\Delta R^2_{\text{Step 3}} = .040$, $b = .398$, $t(185) = 2.56$, $p = .011$) and between ***Essay Affirm After and self-esteem*** ($b = .353$, $t(185) = 2.08$, $p = .039$; See *Table 4.14* for regression analysis results).

Regarding the ***Essay Affirm Before and self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), completing an essay

affirmation task before message exposure had a positive effect on perceived convincingness, $b = .586$, $t(185) = 2.15$, $p = .033$. Although the slope for participants with LSE (-1SD) was not statistically significantly different from zero, $b = -.352$, $t(185) = -1.37$, $p = .172$, it was sufficiently lower than the slope for participants with HSE ($Z = -2.50$, $p = .006$, one tailed).

Contrary to the hypothesis, people with HSE (+1SD) who affirmed their most important value before message exposure (i.e., Essay Affirm Before) expressed higher levels of perceived convincingness than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed their most important value before message exposure showed slightly lower perceived convincingness compared to their counterparts who only read the message (See *Figure 4.7*).

Regarding the ***Essay Affirm After and self-esteem*** interaction, similarly, simple slope analyses showed that among participants with HSE (+1SD), completing an essay affirmation task after message exposure had a positive effect on perceived convincingness, $b = .535$, $t(184) = 2.01$, $p = .046$, while among participants with LSE (-1SD), completing an essay affirmation task after message exposure had no effect on perceived convincingness, $b = -.351$, $t(184) = -1.22$, $p = .223$.

Contrary to the hypothesis, people with HSE (+1SD) who affirmed their most important value after message exposure (i.e., Essay Affirm After) expressed higher levels of perceived convincingness than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed their most important value after message

exposure showed no change on perceived convincingness compared to their counterparts who only read the message (See *Figure 4.8*).

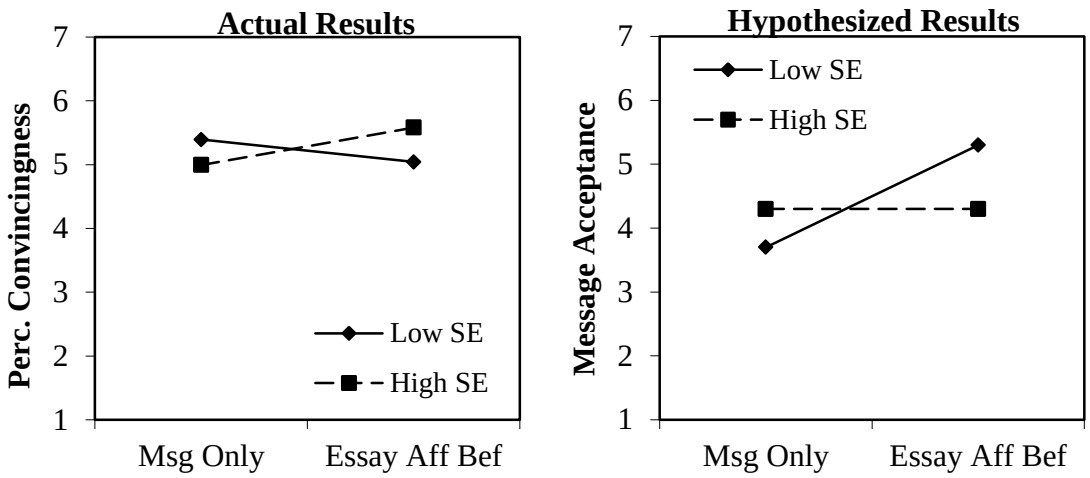


Figure 4.7 Essay Affirm Before x self-esteem effect on perceived convincingness of message

Left: Predicted values for perceived convincingness among participants in the Essay Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for message acceptance among participants in the Essay Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

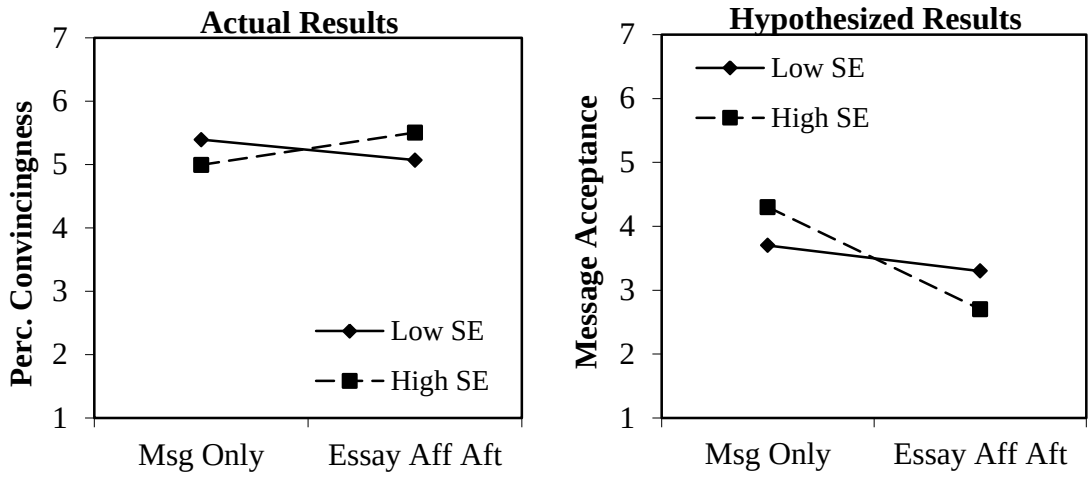


Figure 4.8 Essay Affirm After x self-esteem effect on perceived convincingness of message

Left: Predicted values for perceived convincingness among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for message acceptance among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Perceived Pleasantness. The regression analysis demonstrated an interaction on perceived pleasantness of message between ***Essay Affirm After and self-esteem*** ($\Delta R^2_{\text{Step 3}}$ = .041, b = .647, $t(185) = 2.85$, p = .005) but not between Essay Affirm Before and self-esteem (See *Table 4.15* for regression analysis results). Simple slope analyses showed that among participants with HSE (+1SD), completing an essay affirmation task after message exposure had a positive effect on perceived pleasantness, b = .856, $t(185) = 2.41$, p = .017, while among participants with LSE (-1SD), completing an essay affirmation

task after message exposure had a negative effect on perceived pleasantness, $b = -.668$, $t(185) = -1.77$, $p = .079$.

Contrary to the hypothesis, people with HSE (+1SD) who affirmed their most important value after message exposure (i.e., Essay Affirm After) expressed higher levels of perceived pleasantness than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed their most important value after message exposure expressed lower levels of perceived pleasantness compared to their counterparts who only read the message (See *Figure 4.9*).

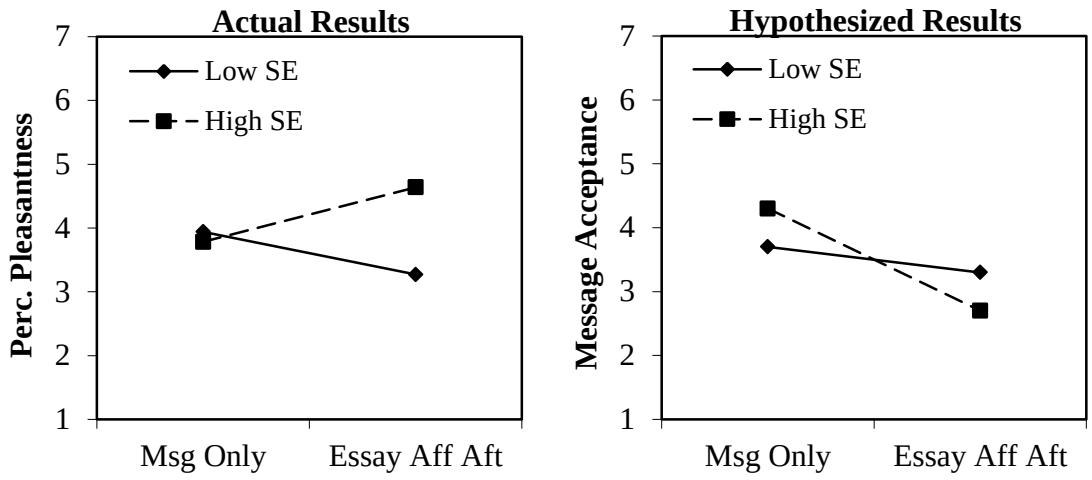


Figure 4.9 Essay Affirm Before x self-esteem effect on perceived pleasantness of message

Left: Predicted values for perceived pleasantness of message among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for message acceptance among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Perceived Relevance. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found. There was no main effect of essay affirmation x timing conditions, either (See *Table 4.15* for regression analysis results).

Effects on Attitude and Intention

Attitude. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found on participants' attitude toward limiting their alcohol consumption to the moderate level every time they drink. There was no main effect of essay affirmation x timing conditions, either (See *Table 4.16* for regression analysis results).

Intention. Unexpectedly, no interaction between self-esteem and essay affirmation x timing conditions was found on participants' intention to limit their alcohol consumption to the moderate level every time they drink. There was no main effect of essay affirmation x timing conditions, either (See *Table 4.16* for regression analysis results).

Table 4.14 Regression Analyses with Defensiveness Measures as Dependent Variables (Step 2 and 3 Results)

	Discomfort		Anger		Message Skepticism		Message Derogation		Perceived Manipulation		Perceived Risk	
N = 192	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	2.30***	.15	1.92***	.13	3.35***	.20	2.86***	.16	2.63***	.14	5.26***	.18
Alcohol Consumption	.30***	.06	.20***	.05	.13	.08	.12†	.07	.17**	.06	-	-
Spon. Self-affirmation	.07	.07	.03	.06	-.01	.09	-.07	.07	-.05	.06	.02	.09
Ctrl Task Bef	-.11	.23	-.05	.20	-.62*	.29	-.16	.24	-.19	.20	-.05	.28
Ctrl Task Aft	-.29	.23	-.33†	.19	-.56*	.28	-.03	.23	-.12	.20	.28	.27
Self-esteem	-.11	.09	-.04	.07	-.12	.11	-.06	.09	-.02	.08	.10	.10
R^2 (ΔR^2 Step 2)	.142 (.016)		.093 (.018)		.056 (.036)		.031 (.005)		.057 (.005)		.016 (.013)	
(Constant)	2.29***	.15	1.92***	.13	3.35***	.19	2.86***	.16	2.63***	.14	5.26***	.18
Alcohol Consumption	.33***	.06	.21***	.05	.15†	.08	.13†	.07	.18**	.06	-	-
Spon. Self-affirmation	.06	.07	.03	.06	-.03	.09	-.07	.07	-.06	.06	.03	.08
Ctrl Task Bef	-.09	.22	-.02	.20	-.64*	.29	-.16	.24	-.18	.21	-.03	.27
Ctrl Task Aft	-.27	.22	.01	.20	-.55*	.28	-.02	.23	-.11	.20	.26	.27
Self-esteem	.09	.13	-.19	.11	.13	.16	.05	.13	.07	.11	-.23	.15
SE x Ctrl Task Bef	-.10	.18	.03	.16	-.36	.23	-.10	.19	-.06	.17	.39†	.22
SE x Ctrl Task Aft	-.65**	.20	-.10	.17	-.52*	.25	-.29	.21	-.27	.18	.80**	.24
R^2 (ΔR^2 Step 3)	.192 (.050)		.101 (.009)		.056 (.024)		.041 (.010)		.069 (.012)		.073 (.057)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.15 Regression Analyses with Message Acceptance Measures as Dependent Variables (Step 2 and 3 Results)

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
N = 192	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.19***	.13	3.86***	.17	4.19***	.23
Alcohol Consumption	-	-	-	-	.14	.10
Spon. Self-affirmation	.06	.06	.10	.08	.09	.11
Essay Aff Bef	.10	.19	.29	.26	-.29	.35
Essay Aff Aft	.11	.19	.15	.26	-.36	.34
Self-esteem	.05	.07	.16†	.10	-.06	.13
R^2 (ΔR^2 Step 2)	.015 (.004)		.039 (.020)		.026 (.008)	
(Constant)	5.19***	.13	3.86***	.17	4.19***	.23
Alcohol Consumption	-	-	-	-	.13	.10
Spon. Self-affirmation	.06	.06	.11	.08	.09	.11
Essay Aff Bef	.14	.19	.29	.26	-.25	.35
Essay Aff Aft	.11	.19	.13	.25	-.35	.34
Self-esteem	-.17	.11	-.07	.14	-.08	.20
SE x Essay Aff Bef	.40*	.16	.21	.21	.36	.29
SE x Essay Aff Aft	.35*	.17	.65**	.23	.10	.31
R^2 (ΔR^2 Step 3)	.055 (.040)		.080 (.041)		.034 (.009)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.16 Regression Analyses with Attitude and Intention Measures as Dependent Variables (Step 2 and 3 Results)

	Attitude		Intention		Intention (Next Month)		Intention (Next 3 Mos.)		Intention (Next 12 Mos.)	
N = 192	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.13***	.14	4.61***	.20	4.57***	.22	4.61***	.22	4.66***	.22
Alcohol Consumption	-.01	.06	-.16†	.08	-.23*	.09	-.17*	.09	-.12	.09
Spon. Self-affirmation	.01	.07	-.04	.10	.07	.11	-	-	.03	.10
Ctrl Task Bef	.17	.22	.13	.30	.38	.34	.11	.34	.04	.33
Ctrl Task Aft	.13	.21	.21	.30	.39	.33	.38	.33	.21	.33
Self-esteem	.06	.08	.20	.11	.01	.13	.08	.12	.09	.13
R^2 (ΔR^2 Step 2)	.008 (.006)		.043 (.018)		.044 (.009)		.029 (.009)		.018 (.005)	
(Constant)	5.13***	.14	4.62***	.20	4.57***	.22	4.61***	.22	4.66***	.22
Alcohol Consumption	-.02	.06	-.16†	.09	-.24*	.10	-.17*	.09	-.14*	.09
Spon. Self-affirmation	.01	.07	-.04	.10	.07	.11	-	-	.04	.10
Ctrl Task Bef	.15	.22	.08	.31	.35	.34	.09	.34	.02	.34
Ctrl Task Aft	.13	.21	.20	.30	.38	.34	.37	.33	.20	.33
Self-esteem	.07	.12	.22	.17	-.06	.19	.04	.18	-.03	.19
SE x Ctrl Task Bef	-.14	.18	-.25	.25	-.07	.28	-.06	.28	.00	.27
SE x Ctrl Task Aft	.14	.19	.21	.27	.36	.30	.25	.30	.44	.30
R^2 (ΔR^2 Step 3)	.018 (.010)		.057 (.014)		.055 (.010)		.034 (.006)		.031 (.014)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

2. Effects of <u>Affirming a Range of Values</u> before or after Message Exposure

Effects on Indicators of Defensiveness

Psychological Discomfort. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. There was no main effect of scale affirmation x timing conditions, either (See *Table 4.17* for regression analysis results).

Anger. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. At step 2 of the regression analysis, there was a main effect of ***Scale Affirm Before***, $\Delta R^2_{\text{Step2}} = .044$, $b = -.397$, $t(187) = -2.36$, $p = .019$, and a main effect of ***Scale Affirm After,*** $b = -.310$, $t(187) = -1.87$, $p = .063$ (See *Table 4.17* for regression analysis results). This means that participants who affirmed a range of values before or after message exposure reported lower levels of anger than participants who only read the message, regardless of their self-esteem levels.

Message Skepticism. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. At step 2 of the regression analysis, there was a main effect of ***Scale Affirm Before*** on message skepticism, $\Delta R^2_{\text{Step2}} = .056$, $b = -.938$, $t(187) = -3.34$, $p = .001$ (See *Table 4.17* for regression analysis results). Participants who affirmed a range of values before message exposure were less skeptical of the health message content than participants who only read the message, regardless of their self-esteem levels.

Message Derogation. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. At step 2 of the regression analysis, there was a main effect of ***Scale Affirm Before*** on message derogation (ΔR^2_{Step2} = .028, *b* = -.522, *t*(187) = -2.27, *p* = .024; See *Table 4.17* for regression analysis results). Participants who affirmed a range of values before message exposure showed lower message derogation than participants who only read the message, regardless of their self-esteem levels.

Perceived Manipulation. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. There was no main effect of scale affirmation x timing conditions, either (See *Table 4.17* for regression analysis results).

Perceived Personal Heart Disease Risk. The regression analysis demonstrated interactions on perceived personal heart disease risk due to excessive drinking between ***Scale Affirm After and self-esteem*** (ΔR^2_{Step3} = .034, *b* = .579, *t*(188) = 2.58, *p* = .011) but not between Scale Affirm Before and self-esteem (See *Table 4.17* for regression analysis results). Simple slope analyses showed that among participants with LSE (-1SD), completing a scale affirmation task after message exposure had a negative effect on perceived personal risk, *b* = -1.02, *t*(188) = -2.51, *p* = .013, while among participants with HSE (+1SD), completing a scale affirmation task after message exposure had no effect on perceived personal risk, *b* = .349, *t*(188) = 1.00, *p* = .321.

Contrary to the hypothesis, people with LSE (-1SD) who affirmed a range of values after message exposure (i.e., Scale Affirm After) expressed lower levels of

perceived personal risk than their counterparts who only read the message, while participants with HSE (+1SD) who affirmed a range of values after message exposure showed no change on perceived personal risk compared to their counterparts who only read the message (See *Figure 4.10*).

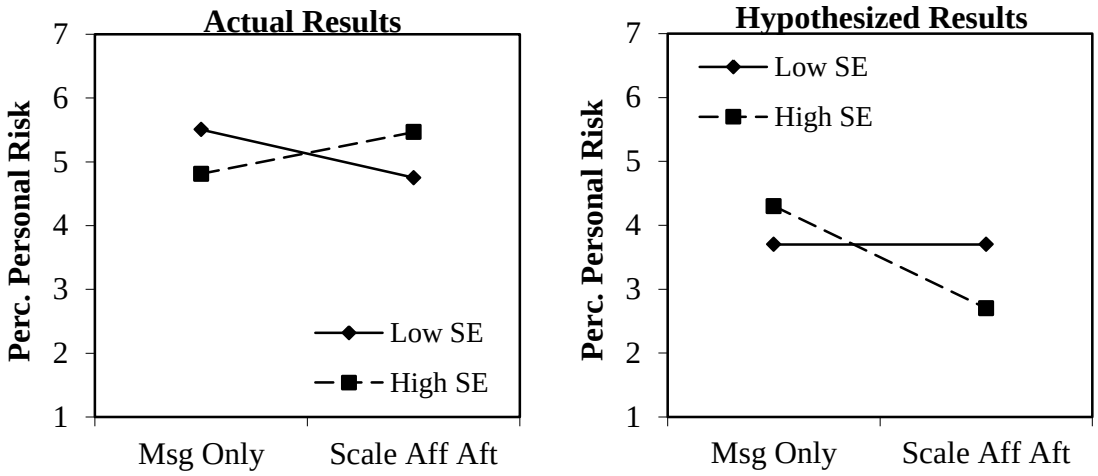


Figure 4.10 Scale Affirm After x self-esteem effect on perceived personal heart disease risk due to excessive drinking

Left: Predicted values for perceived personal risk among participants in the Scale Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for perceived personal risk among participants in the Scale Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Effects on Indicators of Message Acceptance

Perceived Convincingness. The regression analysis demonstrated an interaction on perceived convincingness of message between ***Scale Affirm Before and self-esteem*** ($\Delta R^2_{\text{Step 3}} = .027$, $b = .359$, $t(188) = 2.23$, $p = .027$) but not between Scale Affirm After and self-esteem (See *Table 4.18* for regression analysis results). Simple slope analyses showed that among participants with HSE (+1SD), completing a scale affirmation task before message exposure had a positive effect on perceived convincingness, $b = .801$, $t(188) = 2.37$, $p = .018$, while among participants with LSE (-1SD), completing a scale affirmation task before message exposure had no effect on perceived convincingness, $b = -.073$, $t(188) = -.31$, $p = .755$.

Partially supporting the hypothesis, people with HSE (+1SD) who affirmed a range of values before message exposure (i.e., Scale Affirm Before) expressed higher levels of perceived convincingness than their counterparts who only read the message, while participants with LSE (-1SD) who affirmed a range of values before message exposure showed no change on perceived convincingness compared to their counterparts who only read the message (See *Figure 4.11*).

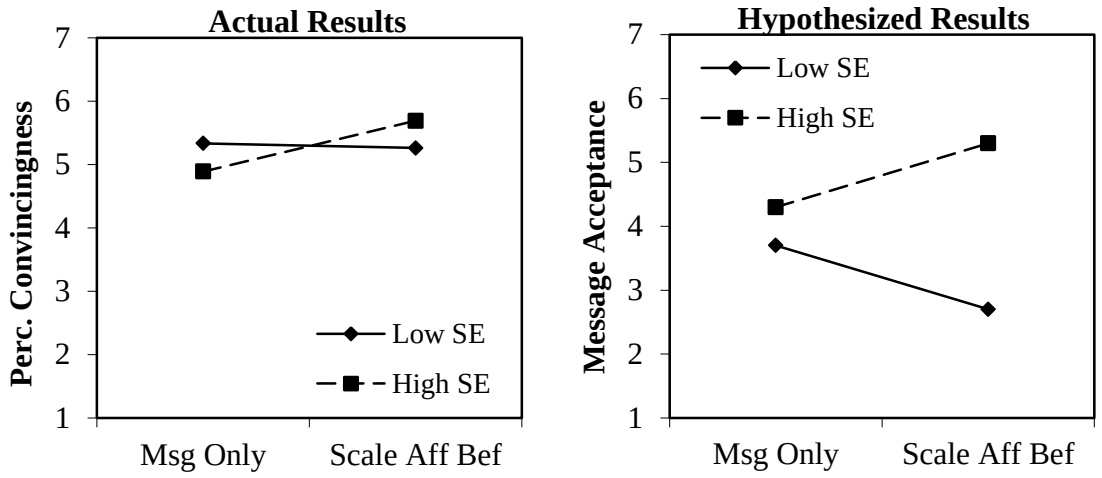


Figure 4.11 Scale Affirm Before x self-esteem effect on perceived convincingness of message

Left: Predicted values for perceived convincingness among participants in the Scale Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for message acceptance among participants in the Scale Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Perceived Pleasantness. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. There was no main effect of scale affirmation x timing conditions, either (See *Table 4.18* for regression analysis results).

Perceived Relevance. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found. There was no main effect of scale affirmation x timing conditions, either (See *Table 4.18* for regression analysis results).

Effects on Attitude and Intention

Attitude. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found on participants' attitude toward limiting their alcohol consumption to the moderate level every time they drink. There was no main effect of scale affirmation x timing conditions, either (See *Table 4.19* for regression analysis results).

Intention. Unexpectedly, no interaction between self-esteem and scale affirmation x timing conditions was found on participants' intention to limit their alcohol consumption to the moderate level every time they drink. However, there was a main effect of ***Scale Affirm Before*** on participants' intentions to limit alcohol consumption to the moderate level every time they drink, $\Delta R^2_{\text{Step 2}} = .038$, $b = .594$, $t(187) = 1.93$, $p = .056$ (See *Table 4.19* for regression analysis results). Participants who affirmed a range of values before message exposure showed higher intentions to limit alcohol consumption every time they drink than participants who only read the message, regardless of their self-esteem levels.

The same pattern of result carried over to two intention measures with time frames. There was a main effect of ***Scale Affirm Before*** on participants' intentions to limit alcohol consumption to the moderate level every time they drink ***in the following month***, $\Delta R^2_{\text{Step 2}} = .015$, $b = .596$, $t(187) = 1.68$, $p = .095$, and ***in next three months***, $\Delta R^2_{\text{Step 2}} = .020$, $b = .640$, $t(188) = 1.91$, $p = .058$ (See *Table 4.19* for regression analysis results). Compared to participants who only read the message, participants who affirmed

a range of values before message exposure reported higher intentions to limit their alcohol consumption to the moderate level every time they drink in the following month and in next three months.

Table 4.17 Regression Analyses with Defensiveness Measures as Dependent Variables (Step 2 and 3 Results)

	Discomfort		Anger		Message Skepticism		Message Derogation		Perceived Manipulation		Perceived Risk	
N = 195	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	2.32***	.15	1.94***	.11	3.36***	.19	2.87***	.15	2.64***	.15	5.26***	.18
Alcohol Consumption	.27***	.06	.23***	.05	.11	.08	.12†	.06	.19**	.06	-	-
Spon. Self-affirmation	.19**	.07	.12*	.05	.03	.09	-.06	.07	.02	.07	.08	.08
Ctrl Task Bef	.02	.23	-.39*	.17	-.94**	.28	-.52*	.23	.06	.22	.01	.28
Ctrl Task Aft	-.15	.23	-.32†	.17	-.42	.28	-.11	.23	.08	.22	-.19	.27
Self-esteem	-.11	.08	-.13	.06	.01	.10	.00	.09	.05	.08	.05	.10
R^2 (ΔR^2 Step 2)	.142 (.012)		.192 (.044)		.068 (.056)		.052 (.028)		.057 (.003)		.010 (.005)	
(Constant)	2.32***	.15	1.94***	.11	3.36***	.19	2.87***	.15	2.64***	.15	5.25***	.18
Alcohol Consumption	.28***	.06	.24***	.05	.12	.08	.13*	.06	.20**	.06	-	-
Spon. Self-affirmation	.19**	.07	.12*	.05	.03	.09	-.06	.07	.01	.07	.05	.08
Ctrl Task Bef	.01	.23	-.40*	.17	-.94**	.28	-.52*	.23	.07	.22	.02	.28
Ctrl Task Aft	-.15	.23	-.31†	.17	-.39	.28	-.09	.23	.10	.22	-.25	.27
Self-esteem	.02	.13	-.01	.09	.09	.16	.04	.13	.05	.12	-.20	.15
SE x Ctrl Task Bef	-.29	.19	-.20	.14	-.03	.23	.04	.19	.13	.18	.27	.22
SE x Ctrl Task Aft	-.13	.19	-.19	.14	-.24	.23	-.16	.19	-.12	.18	.56*	.23
R^2 (ΔR^2 Step 3)	.153 (.011)		.204 (.012)		.074 (.006)		.057 (.006)		.065 (.008)		.041 (.031)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.18 Regression Analyses with Message Acceptance Measures as Dependent Variables (Step 2 and 3 Results)

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
N = 195	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.20***	.13	3.84***	.17	4.22***	.22
Alcohol Consumption	-	-	-	-	.14	.09
Spon. Self-affirmation	.10	.06	.03	.08	.23*	.11
Essay Aff Bef	.19	.20	-.28	.26	-.18	.34
Essay Aff Aft	.02	.20	.22	.26	.44	.33
Self-esteem	-.00	.07	.03	.09	-.03	.12
R^2 (ΔR^2 Step 2)	.023 (.006)		.020 (.019)		.063 (.017)	
(Constant)	5.19***	.13	3.84***	.17	4.22***	.22
Alcohol Consumption	-	-	-	-	.13	.09
Spon. Self-affirmation	.10	.06	.02	.08	.23*	.11
Essay Aff Bef	.21	.20	-.27	.26	-.18	.34
Essay Aff Aft	.01	.20	.23	.26	.40	.33
Self-esteem	-.18†	.11	-.03	.14	-.14	.19
SE x Essay Aff Bef	.36*	.16	.24	.21	.09	.27
SE x Essay Aff Aft	.24	.16	-.02	.21	.28	.28
R^2 (ΔR^2 Step 3)	.049 (.027)		.029 (.008)		.068 (.005)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.19 Regression Analyses with Attitude and Intention Measures as Dependent Variables (Step 2 and 3 Results)

	Attitude		Intention		Intention (Next Month)		Intention (Next 3 Mos.)		Intention (Next 12 Mos.)	
N = 195	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.12***	.14	4.62***	.20	4.56***	.22	4.61***	.22	4.66***	.22
Alcohol Consumption	-.01	.06	-.12	.08	-.15	.09	-.11	.09	-.08	.09
Spon. Self-affirmation	-.03	.06	-.03	.10	.03	.11	-	-	.06	.10
Ctrl Task Bef	.27	.21	.59†	.31	.59†	.34	.65†	.33	.52	.33
Ctrl Task Aft	.12	.20	-.02	.30	.28	.33	.21	.33	.06	.33
Self-esteem	.10	.08	.21	.11	.07	.13	.03	.12	.01	.12
R^2 (ΔR^2 Step 2)	.132 (.017)		.056 (.038)		.033 (.015)		.028 (.020)		.022 (.015)	
(Constant)	5.12***	.14	4.62***	.21	4.56***	.24	4.61***	.22	4.66***	.22
Alcohol Consumption	-.01	.06	-.11	.08	-.16	.10	-.11	.09	-.08	.09
Spon. Self-affirmation	-.03	.07	-.03	.10	.03	.11	-	-	.06	.10
Ctrl Task Bef	.28	.21	.59†	.31	.60†	.36	.64†	.34	.52	.33
Ctrl Task Aft	.11	.21	-.01	.31	.28	.35	.19	.33	.06	.33
Self-esteem	.09	.12	.24	.17	-.01	.20	.06	.18	-.02	.19
SE x Ctrl Task Bef	-.01	.17	-.00	.25	.17	.29	-.16	.27	.04	.27
SE x Ctrl Task Aft	.05	.17	-.09	.26	.09	.29	.05	.28	.04	.28
R^2 (ΔR^2 Step 3)	.134 (.001)		.057 (.001)		.034 (.002)		.031 (.003)		.022 (.000)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

3. Effects of <u>Completing a Control Task</u> before or after Message Exposure

Effects on Indicators of Defensiveness

Psychological Discomfort. The regression analysis demonstrated an interaction on psychological discomfort between ***Control Task Before and self-esteem*** (ΔR^2_{Step3} = .016, b = -.350, t(179) = -1.74, p = .084), but not between other condition variables and self-esteem (See *Table 4.20* for regression analysis results). Simple slope analyses showed that the slopes for participants with HSE (+1SD) (b = -.339, t(179) = -1.02, p = .311) and with LSE (-1SD) (b = .548, t(179) = 1.45, p = .149) were not statistically significantly different from zero. However, the slope for participants with LSE was sufficiently higher than the slope for participants with HSE (Z = 1.76, p = .039, one tailed).

Unexpectedly, participants with LSE (-1SD) who completed a control task before message exposure (i.e., Control Task Before) expressed slightly higher levels of psychological discomfort than their counterparts who only read the message, while people with HSE (+1SD) who completed a control task before message exposure expressed slightly lower levels of psychological discomfort than their counterparts who only read the message (See *Figure 4.12*).

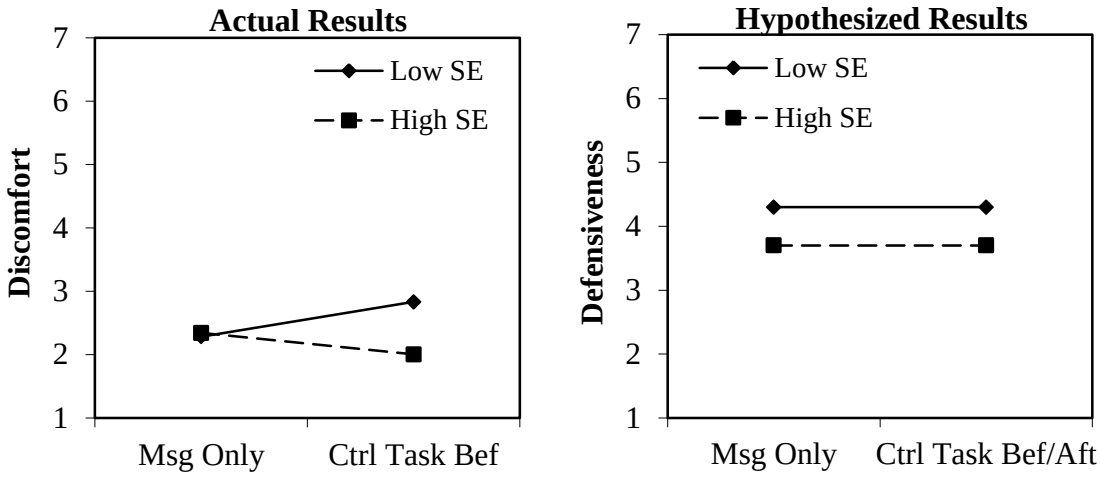


Figure 4.12 Control Task Before x self-esteem effect on psychological discomfort

Left: Predicted values for psychological discomfort among participants in the Control Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for defensiveness among participants in the Control Task Before or After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Anger. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.20* for regression analysis results).

Message Skepticism. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.20* for regression analysis results).

Message Derogation. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.20* for regression analysis results).

Perceived Manipulation. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.20* for regression analysis results).

Perceived Personal Heart Disease Risk. The regression analysis demonstrated an interaction on perceived personal heart disease risk due to excessive drinking between ***Control Task After and self-esteem*** (ΔR^2_{Step3} = .022, b = .410, $t(180)$ = 1.98, p = .050), but not between Control Task Before and self-esteem (See *Table 4.20* for regression analysis results). Simple slope analyses showed that the slopes for participants with HSE (+1SD) (b = .592, $t(180)$ = 1.51, p = .208) and with LSE (-1SD) (b = -.447, $t(180)$ = -1.26, p = .208) were not statistically significantly different from zero. However, the slope for participants with HSE was sufficiently higher than the slope for participants with LSE (Z = 1.96, p = .024, one tailed).

Unexpectedly, participants with HSE (+1SD) who completed a control task after message exposure (i.e., Control Task After) expressed slightly higher levels of perceived personal risk than their counterparts who only read the message, while people with LSE (-1SD) who completed a control task after message exposure expressed slightly lower levels of perceived personal risk than their counterparts who only read the message (See *Figure 4.13*).

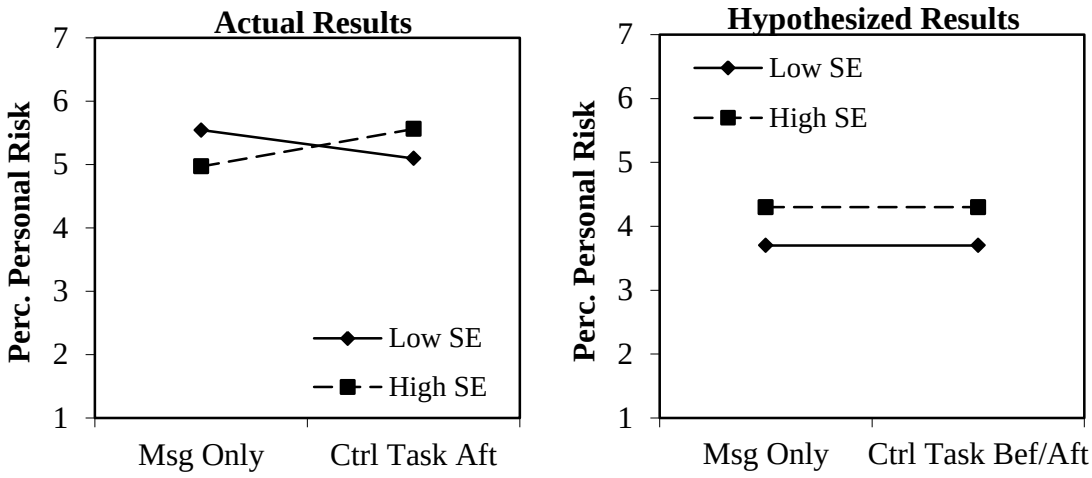


Figure 4.13 Control Task After x self-esteem effect on perceived personal heart disease risk due to excessive drinking

Left: Predicted values for perceived personal risk among participants in the Control Task After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for perceived personal risk among participants in the Control Task Before or After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Effects on Indicators of Message Acceptance

Perceived Convincingness. The regression analysis demonstrated an interaction on perceived convincingness of message between ***Control Task After and self-esteem*** ($\Delta R^2_{\text{Step 3}} = .032$, $b = .403$, $t(180) = 2.41$, $p = .017$), but not between Control Task Before and self-esteem (See *Table 4.21* for regression analysis results). Simple slope analyses showed that among participants with HSE (+1SD), completing a control task after message exposure had a positive effect on perceived convincingness, $b = .592$, $t(180) =$

1.86, p = .064, while among participants with LSE (-1SD), completing a control task after message exposure had no effect, b = -.429, $t(180)$ = -1.51, p = .134.

Contrary to the hypothesis, people with HSE (+1SD) who did a control task after message exposure (i.e., Control Task After) expressed higher levels of perceived convincingness than their counterparts who only read the message, while participants with LSE (-1SD) who did a control task after message exposure showed no change on perceived convincingness compared to their counterparts who only read the message (See *Figure 4.14*).

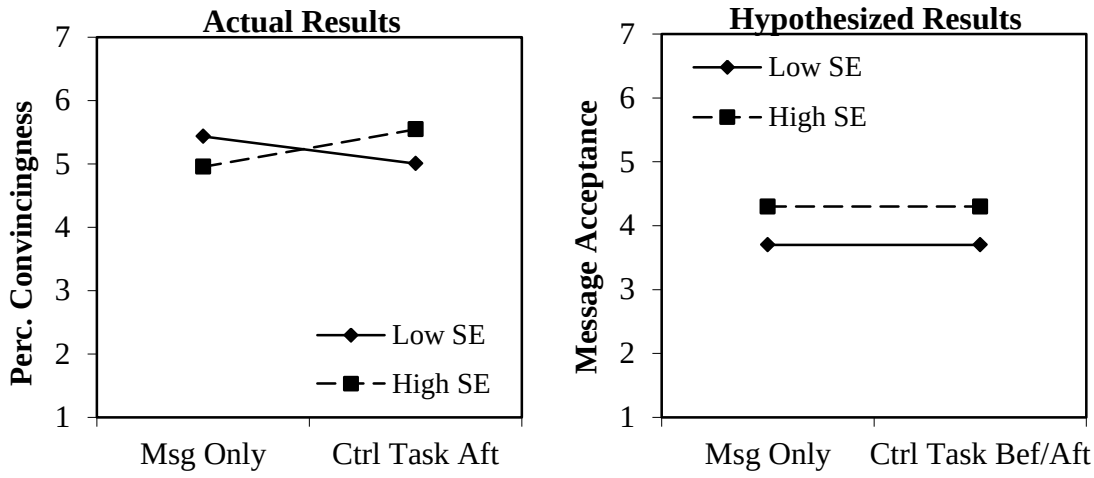


Figure 4.14 Control Task After x self-esteem effect on perceived convincingness of message

Left: Predicted values for perceived convincingness among participants in the Control Task After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Right: Hypothesized results for message acceptance among participants in the Control Task Before or After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Perceived Pleasantness. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.21* for regression analysis results).

Perceived Relevance. As expected, no interaction between self-esteem and control task x timing conditions was found. There was no main effect of control task x timing conditions, either (See *Table 4.21* for regression analysis results).

Effects on Attitude and Intention

Attitude. As expected, no interaction between self-esteem and control task x timing conditions was found on participants' attitude toward limiting their alcohol consumption to the moderate level every time they drink. There was no main effect of control task x timing conditions, either (See *Table 4.22* for regression analysis results).

Intention. As expected, no interaction between self-esteem and control task x timing conditions was found on participants' intention to limit their alcohol consumption to the moderate level every time they drink. There was no main effect of control task x timing conditions, either (See *Table 4.22* for regression analysis results).

Table 4.20 Regression Analyses with Defensiveness Measures as Dependent Variables (Step 2 and 3 Results)

	Discomfort		Anger		Message Skepticism		Message Derogation		Perceived Manipulation		Perceived Risk	
N = 187	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	2.32***	.16	1.93***	.14	3.35***	.20	2.87***	.17	2.64***	.14	5.26***	.17
Alcohol Consumption	.24***	.06	.15**	.06	.08	.08	.07	.07	.10†	.06	-	-
Spon. Self-affirmation	.17*	.08	.07	.07	-.01	.10	-.03	.08	.02	.07	-.03	.07
Ctrl Task Bef	.05	.25	.07	.21	-.17	.31	.12	.26	.12	.22	-.17	.27
Ctrl Task Aft	-.21	.25	-.28	.21	-.11	.31	.14	.26	.15	.22	.03	.27
Self-esteem	-.11	.09	-.05	.07	.01	.11	-.00	.09	.02	.08	-.02	.09
R^2 (ΔR^2 Step 2)	.105 (.012)		.057 (.015)		.007 (.002)		.009 (.002)		.020 (.003)		.004 (.004)	
(Constant)	2.31***	.16	1.93***	.14	3.35***	.20	2.87***	.17	2.64***	.14	5.26***	.17
Alcohol Consumption	.26***	.07	.15***	.06	.08	.08	.07	.07	.10	.06	-	-
Spon. Self-affirmation	.16†	.08	.07	.07	.00	.10	-.03	.08	.03	.07	-.04	.07
Ctrl Task Bef	.10	.25	.05	.21	-.20	.31	.10	.26	.10	.22	-.18	.27
Ctrl Task Aft	-.20	.25	-.30	.21	-.14	.31	.13	.26	.14	.22	.08	.27
Self-esteem	.02	.14	-.02	.12	.09	.17	.00	.14	.00	.12	-.24	.14
SE x Ctrl Task Bef	-.35†	.20	.03	.17	-.02	.25	.05	.21	.09	.18	.28	.22
SE x Ctrl Task Aft	-.08	.19	-.10	.16	-.23	.24	-.07	.20	-.04	.17	.42*	.21
R^2 (ΔR^2 Step 3)	.120 (.016)		.061 (.003)		.013 (.006)		.010 (.002)		.023 (.003)		.027 (.023)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.21 Regression Analyses with Message Acceptance Measures as Dependent Variables (Step 2 and 3 Results)

	Perceived Convincingness		Perceived Pleasantness		Perceived Relevance	
N = 187	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.20***	.14	3.86***	.17	4.20***	.22
Alcohol Consumption	-	-	-	-	.22	.09
Spon. Self-affirmation	.13	.07	.14	.08	.16	.11
Essay Aff Bef	-.20	.22	-.14	.26	-.19	.34
Essay Aff Aft	.02	.22	.07	.26	-.10	.34
Self-esteem	-.03	.08	.01	.09	-.07	.12
R^2 (ΔR^2 Step 2)	.022 (.008)		.018 (.003)		.045 (.004)	
(Constant)	5.20***	.14	3.86***	.17	4.20***	.22
Alcohol Consumption	-	-	-	-	.22	.09
Spon. Self-affirmation	.12†	.07	.13	.09	.14	.11
Essay Aff Bef	-.19	.21	-.15	.26	-.14	.34
Essay Aff Aft	.08	.21	.09	.26	-.05	.34
Self-esteem	-.19	.12	-.08	.14	-.07	.19
SE x Essay Aff Bef	.11	.17	.11	.21	-.20	.28
SE x Essay Aff Aft	.40*	.17	.18	.20	.18	.27
R^2 (ΔR^2 Step 3)	.054 (.032)		.023 (.004)		.054 (.009)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Table 4.22 Regression Analyses with Attitude and Intention Measures as Dependent Variables (Step 2 and 3 Results)

	Attitude		Intention		Intention (Next Month)		Intention (Next 3 Mos.)		Intention (Next 12 Mos.)	
N = 187	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
(Constant)	5.16***	.14	4.65***	.21	4.58***	.22	4.61***	.22	4.70***	.22
Alcohol Consumption	-.09	.06	-.23**	.08	-.22*	.09	-.26**	.09	-.28**	.09
Spon. Self-affirmation	.17	.07	.15	.10	.15	.11	-	-	.26*	.11
Ctrl Task Bef	-.21	.21	-.14	.31	.13	.34	.06	.34	-.05	.33
Ctrl Task Aft	.11	.21	.04	.31	.42	.34	.09	.34	-.06	.33
Self-esteem	-.02	.07	.05	.11	-.05	.12	-.07	.11	-.18	.12
R^2 (ΔR^2 Step 2)	.056 (.011)		.062 (.002)		.049 (.010)		.048 (.003)		.084 (.013)	
(Constant)	5.15***	.14	4.65***	.21	4.58***	.22	4.61***	.22	4.70***	.22
Alcohol Consumption	-.09	.06	-.22**	.08	-.22*	.09	-.26**	.09	-.28**	.09
Spon. Self-affirmation	.16	.07	.14	.10	.14	.11	-	-	.26*	.11
Ctrl Task Bef	-.16	.21	-.10	.32	.15	.34	.06	.34	-.05	.33
Ctrl Task Aft	.14	.21	.05	.32	.45	.34	.08	.34	-.06	.33
Self-esteem	-.02	.12	.13	.17	-.08	.19	.01	.18	-.17	.18
SE x Ctrl Task Bef	-.16	.17	-.22	.26	-.06	.28	-.11	.27	-.02	.27
SE x Ctrl Task Aft	.16	.17	-.04	.25	.14	.27	-.14	.27	-.03	.26
R^2 (ΔR^2 Step 3)	.072 (.016)		.066 (.004)		.052 (.003)		.049 (.002)		.084 (.000)	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .1$. Spon. Self-affirmation refers to spontaneous self-affirmation tendency.

Supplementary Analysis

Similar to Study 2, the distribution of self-esteem scores in the sample was negatively skewed, though less severe than in the Study 2 sample ($Skewness_{Study3}$ = -.395 vs. $Skewness_{Study2}$ = -.795; See *Figure 4.15*). As discussed in Study 2, the skewed distribution of self-esteem might have reduced the statistical power of the regression analyses in detecting self-esteem x self-affirmation interaction effects (McClelland & Judd, 1993).

Previous research suggests that self-affirmation effects are usually more pronounced among individuals who are at moderate to high risk, because to them, the health risk information is most personally relevant and threatening (e.g., Harris & Napper, 2005; van Koningsbruggen & Das, 2009). Thus, because the self-affirmation effects are theorized to be more pronounced (e.g., have bigger effect sizes) among people at moderate to high risk, if there were essay affirmation x self-esteem interaction effects but the skewed self-esteem distribution reduced the statistical power for detecting these effects, we may still be able to detect these effects among participants at moderate to high risk if they were not found in the full sample.

To examine whether the proposed interaction effects can be found among people for whom the self-affirmation effects are theoretically most pronounced, I restricted the sample to participants with high levels of personal risk and reran the regression analyses for each dependent variable.

Personal risk level in this study refers to participants' levels of risk of developing heart disease due to excessive drinking. It is inferred though participants' current alcohol consumption levels. I operationalized high levels of personal risk as engaging in high-risk drinking defined by USDA dietary guidelines 2015-2020: consuming more than 3 drinks on any day for women[5] and more than 4 drinks on any day for men ("Appendix 9. Alcohol," n.d.). Selecting high-risk drinkers resulted in a sample size of 218 for the new analyses (See *Table 4.23*).

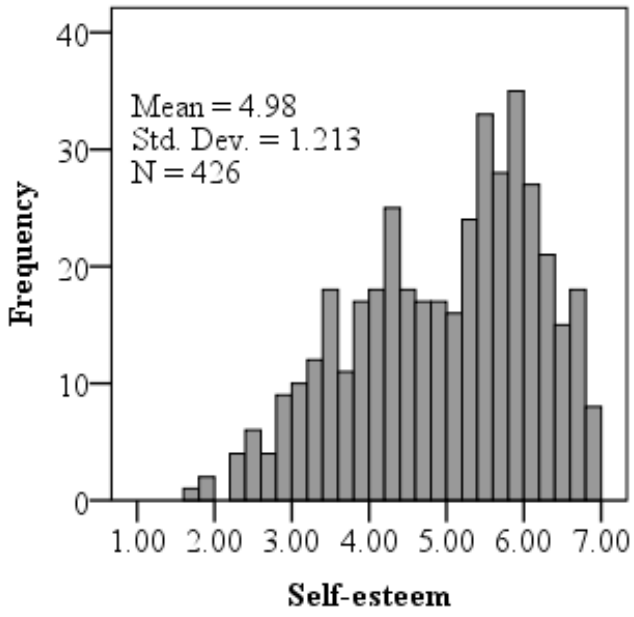


Figure 4.15 Histogram showing the distribution of self-esteem scores

[5] The question assessing alcohol consumption on a typical drinking day collapsed 3 drinks and 4 drinks into the same category. Therefore, I categorized women who selected "3 to 4 drinks" or more as high-risk drinkers.

Table 4.23 Current Alcohol Consumption

Reponses to the question "During the last 12 months, on a typical day when you drank alcohol, how many drinks did you have?"

	Women		Men		Other[6]	
Number of Drinks	Frequency	Percent	Frequency	Percent	Frequency	Percent
2 drinks	145	50.9			1	25
3 to 4 drinks	**94**	**33.0**	60	43.8	2	50
5 to 6 drinks	**26**	**9.1**	**36**	**26.3**	**1**	**25**
7 to 8 drinks	**7**	**2.5**	**18**	**13.1**		
9 to 11 drinks	**6**	**2.1**	**10**	**7.3**		
12 to 15 drinks	**1**	**.4**	**7**	**5.1**		
16 to 18 drinks	**3**	**1.1**	**4**	**2.9**		
19 to 24 drinks	**1**	**.4**	**1**	**.7**		
25 or more drinks	**2**	**.7**	**1**	**.7**		
Total	185	100	137	100	4	100

Regression analyses with the high-risk drinker subsample were conducted for each dependent variable with mean-centered self-esteem and dummy-coded self-affirmation x timing experimental condition variables (i.e., Essay Affirm Before, Essay Affirm After, Scale Affirm Before, Scale Affirm After, Control Task Before, and Control Task After) entered at step 1 and the six two-way interaction terms of condition variable x self-esteem entered at step 2. To avoid further reducing degree of freedom in the

[6] Because the question on gender asked about the gender participants identify with rather than their biological and physiological characteristics "sex," it is impossible to determine whether participants who identified as "other" were male or female. I followed the guideline for male for these participants and categorized the participant that drinks 5 to 6 drinks on a typical drink day as high-risk drinker.

analyses, I did not include spontaneous self-affirmation tendency or current alcohol consumption as control variables.

On the indicators of **defensiveness** and **message acceptance**, most of the self-affirmation x self-esteem interaction effects that were identified in previous analyses with the full sample remained evident in the analyses with high-risk drinkers. Exceptions were the Essay Affirm After x self-esteem interaction on message skepticism, the Essay Affirm Before x self-esteem interaction on perceived personal risk and perceived convincingness, and the Scale Affirm Before x self-esteem interaction on perceived convincingness (See *Table 4.24* for an outline). Because the nature of the interaction effects on the indicators of defensiveness and message acceptance is consistent with the interaction effects identified in the previous analyses with the full sample, I will not report individual simple slope analyses for these interactions.

Interestingly, the new analyses with the high-risk drinkers revealed interaction effects on **attitude and intention** measures between Essay Affirm After and self-esteem, between Scale Affirm Before and self-esteem, and between Control Task After and self-esteem:

On **attitude toward limiting alcohol consumption to the moderate level**, the regression analysis revealed an ***Essay Affirm After x self-esteem*** interaction ($\Delta R^2_{\text{Step 3}}$ = .034, b = .471, $t(204) = 1.78$, p = .077) and a ***Control Task After x self-esteem*** interaction (b = .451, $t(204) = 1.86$, p = .064).

On **intention to limit alcohol consumption to the moderate level**, the regression analysis revealed an ***Essay Affirm After x self-esteem*** interaction ($\Delta R^2_{\text{Step 3}}$ = .042, *b* = .692, *t*(204) = 1.84, *p* = .067) and a ***Scale Affirm Before x self-esteem*** interaction (*b* = .876, *t*(204) = 2.42, *p* = .016).

On **intention to limit alcohol consumption to the moderate level in the following month**, the regression analysis revealed an ***Essay Affirm After x self-esteem*** interaction ($\Delta R^2_{\text{Step 3}}$ = .054, *b* = .994, *t*(204) = 2.40, *p* = .017), a ***Scale Affirm Before x self-esteem*** interaction (*b* = 1.06, *t*(204) = 2.67, *p* = .008), and a ***Control Task After x self-esteem*** interaction (*b* = .650, *t*(204) = 1.72, *p* = .087).

On **intention to limit alcohol consumption to the moderate level in next three months**, the regression analysis revealed an ***Essay Affirm After x self-esteem*** interaction ($\Delta R^2_{\text{Step 3}}$ = .028, *b* = .894, *t*(204) = 2.23, *p* = .027).

On **intention to limit alcohol consumption to the moderate level in next twelve months**, the regression analysis revealed an ***Essay Affirm After x self-esteem*** interaction ($\Delta R^2_{\text{Step 3}}$ = .045, *b* = 1.12, *t*(204) = 2.75, *p* = .007) and a ***Scale Affirm Before x self-esteem*** interaction (*b* = .845, *t*(204) = 2.16, *p* = .032).

Table 4.24 Outline of Analyses Results with the High-Risk Drinker Subsample

Effects of affirming the most important value *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects
Indicators of Defensiveness	Discomfort	Essay Aff Aft x SE	-
	Anger	-	~~Essay Aff Aft (-)~~
	Skepticism	~~Essay Aff Aft x SE~~	Essay Aff Bef (-)

			Essay Aff Aft (-)
	Derogation	-	-
	Perc. Manip.	-	-
	Perc. Risk	~~Essay Aff Bef x SE~~ Essay Aff Aft x SE	-
Indicators of Message Acceptance	Perc. Conv.	~~Essay Aff Bef x SE~~ Essay Aff Aft x SE	-
	Perc. Pleas.	Essay Aff Aft x SE	-
	Perc. Relev.	-	**Essay Aff Aft (-)**
Attitude and Intention Measures	Attitude	**Essay Aff Aft x SE**	-
	Intention	**Essay Aff Aft x SE**	-
	Int (Next mo)	**Essay Aff Aft x SE**	-
	Int (Next 3 mo)	**Essay Aff Aft x SE**	-
	Int (Next 12 mo)	**Essay Aff Aft x SE**	-
Effects of affirming a range of values *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects
Indicators of Defensiveness	Discomfort	**Scale Aff Bef x SE**	-
	Anger	-	~~Scale Aff Bef (-)~~ ~~Scale Aff Aft (-)~~
	Skepticism	-	Scale Aff Bef (-) **Scale Aff Aft (-)**
	Derogation	-	Scale Aff Bef (-)
	Perc. Manip.	-	-
	Perc. Risk	Scale Aff Aft x SE	-
Indicators of Message Acceptance	Perc. Conv.	~~Scale Aff Bef x SE~~ **Scale Aff Aft x SE**	-
	Perc. Pleas.	-	-
	Perc. Relev.	-	-
Attitude and	Attitude	-	-

Intention Measures	Intention	**Scale Aff Bef x SE**	~~Scale Aff Bef (+)~~
	Int (Next mo)	**Scale Aff Bef x SE**	~~Scale Aff Bef (+)~~ **Scale Aff Aft (+)**
	Int (Next 3 mo)	-	Scale Aff Bef (+) **Scale Aff Aft (+)**
	Int (Next 12 mo)	**Scale Aff Bef x SE**	-
Effects of completing a control task *before* or *after* message exposure			
Dependent Variables		Interaction Effects	Main Effects
Indicators of Defensiveness	Discomfort	Ctrl Task Bef x SE	-
	Anger	-	**Ctrl Task Aft (-)**
	Skepticism	-	-
	Derogation	-	-
	Perc. Manip.	-	-
	Perc. Risk	Ctrl Task Aft x SE	-
Indicators of Message Acceptance	Perc. Conv.	Ctrl Task Aft x SE	-
	Perc. Pleas.	-	-
	Perc. Relev.	-	-
Attitude and Intention Measures	Attitude	**Ctrl Task Aft x SE**	-
	Intention	-	-
	Int (Next mo)	**Ctrl Task Aft x SE**	-
	Int (Next 3 mo)	-	-
	Int (Next 12 mo)	-	-

Note. Discomfort refers to Psychological Discomfort. Skepticism refers to Message Skepticism. Derogation refers to Message Derogation. Perc. Manip. refers to Perceived Manipulation. Perc. Risk refers to Perceived Personal Heart Disease Risk due to Excessive Drinking. Perc. Conv. refers to Perceived Convincingness. Perc. Pleas. refers to Perceived Pleasantness. Perc. Relev. refers to Perceived Relevance. Int refers to Intention.

Attitude toward Limiting Alcohol Consumption

Regarding the ***Essay Affirm After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming the most important value after message exposure had a positive effect on attitude toward limiting alcohol consumption, $b = .758$, $t(204) = 1.76$, $p = .088$. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, $b = -.418$, $t(204) = -.90$, $p = .367$ (See *Figure 4.16*).

Regarding the ***Control Task After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), completing a control task after message exposure had a positive effect on attitude toward limiting alcohol consumption, $b = .814$, $t(204) = 1.87$, $p = .063$. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, $b = -.312$, $t(204) = -.68$, $p = .495$ (See *Figure 4.16*).

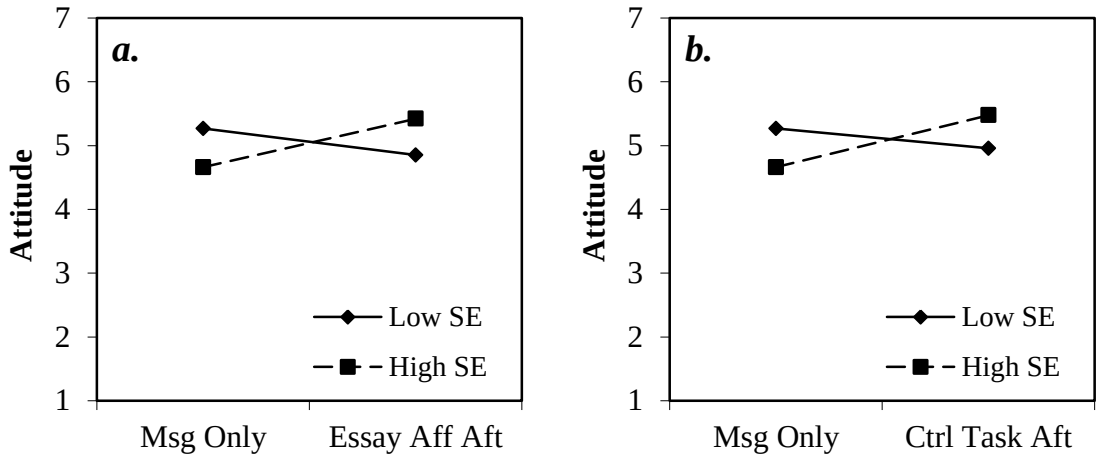


Figure 4.16 Effects of Essay Affirm After x self-esteem and Control Task After x self-esteem on attitude toward limiting alcohol consumption to the moderate level among high risk drinkers

a. Predicted values for attitude among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)
b. Predicted values for attitude among participants in the Control Task After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention to Limit Alcohol Consumption

Regarding the ***Essay Affirm After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming the most important value after message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks, $b = 1.550$, $t(204) = 2.55$, $p = .012$. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, $b = -.178$, $t(204) = -.27$, $p = .787$, $b_{\text{Mean SE}} = .686$, $t(204) = 1.61$, $p = .109$ (See *Figure 4.17*).

Regarding the ***Scale Affirm Before x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD) and those with mean levels of self-esteem, affirming a range of values before message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks, $b = 2.151$, $t(204) = 3.32$, $p = .001$. However, among participants with LSE (-1SD) affirming the most important value after message exposure had no effect, $b = -.037$, $t(204) = -.06$, $p = .953$ (See *Figure 4.17*).

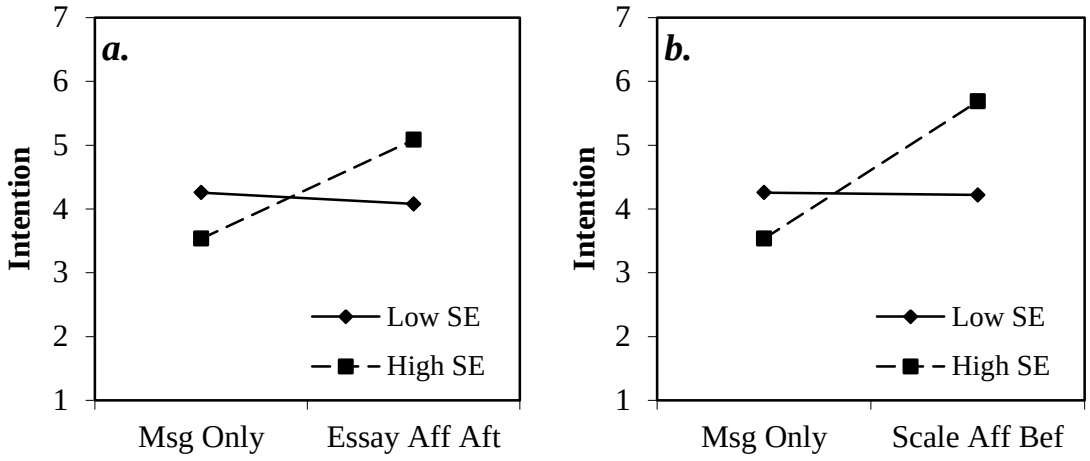


Figure 4.17 Effects of Essay Affirm After x self-esteem and Scale Affirm Before x self-esteem on intention to limit alcohol consumption to the moderate level every time one drinks among high risk drinkers

a. Predicted values for intention among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

b. Predicted values for intention among participants in the Scale Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention to Limit Alcohol Consumption in the Following Month

Regarding the ***Essay Affirm After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming the most important value after message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in the following month, $b = 2.286$, $t(204) = 3.40$, $p = .001$. However, among participants with LSE (-1SD), affirming the most

important value after message exposure had no effect, b = -.196, t(204) = -.27, p = .787 (See *Figure 4.18*).

Regarding the ***Scale Affirm Before x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD) and those with mean levels of self-esteem, affirming a range of values before message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in the following month, b = 2.507, t(204) = 3.51, p = .001. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, b = -.015, t(204) = -.22, p = .828 (See *Figure 4.18*).

Regarding the ***Control Task After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming a range of values before message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in the following month, b = 1.79, t(204) = 2.63, p = .009. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, b = .166, t(204) = .233, p = .816 (See *Figure 4.18*).

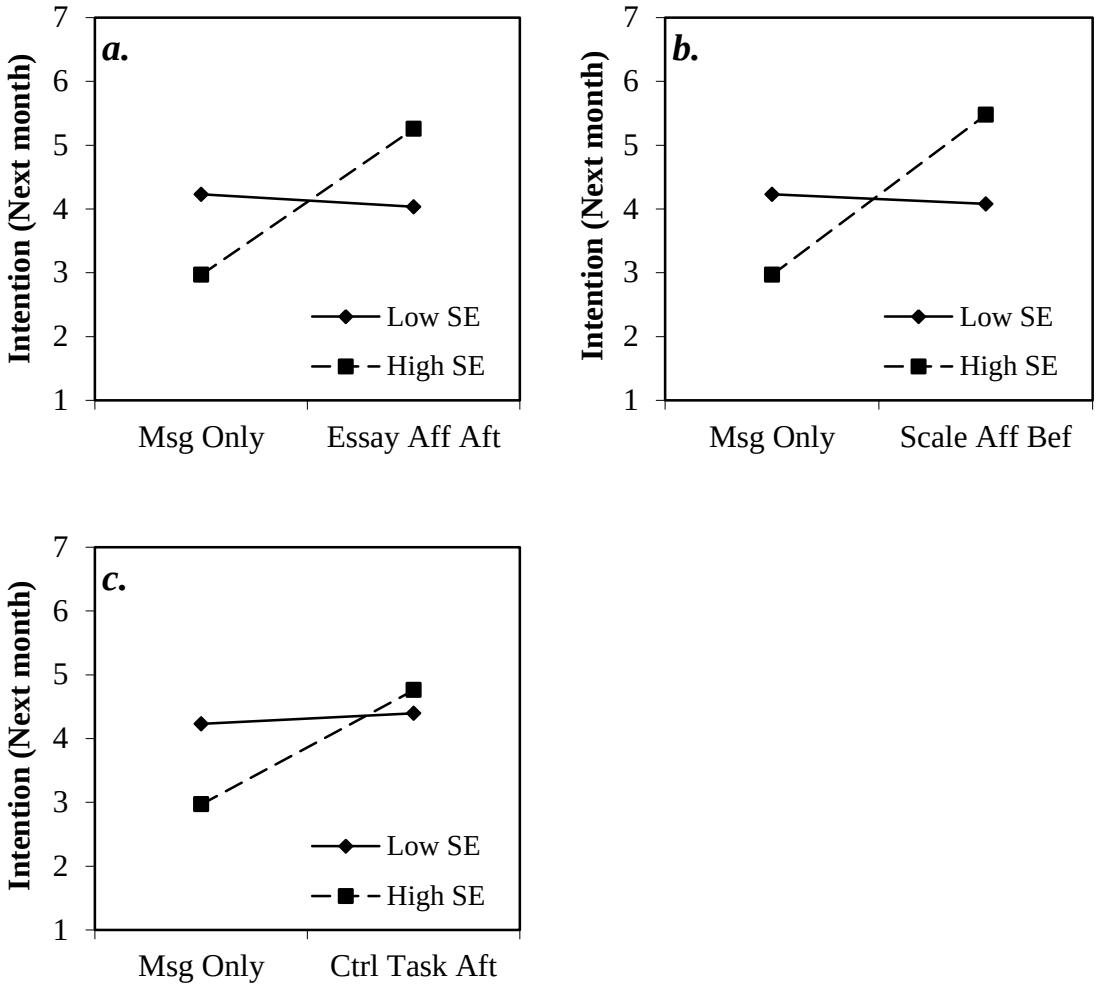


Figure 4.18 Effects of Essay Affirm After x self-esteem, Scale Affirm Before x self-esteem, and Control Task After x self-esteem on intention to limit alcohol consumption to the moderate level every time one drinks in the following month among high risk drinkers

a. Predicted values for intention in the following month among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

b. Predicted values for intention in the following month among participants in the Scale Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

c. Predicted values for intention in the following month among participants in the Control Task After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention to Limit Alcohol Consumption in Next Three Months

Regarding the ***Essay Affirm After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming the most important value after message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in the following month, $b = 2.062$, $t(204) = 3.16$, $p = .002$. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, $b = -.171$, $t(204) = -.24$, $p = .808$ (See *Figure 4.19*).

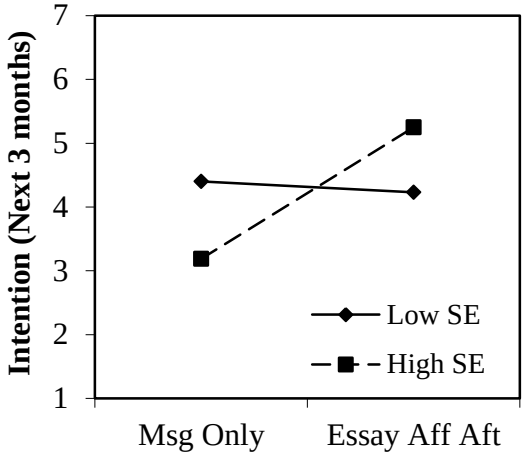


Figure 4.19 Essay Affirm After x self-esteem effect on intention to limit alcohol consumption to the moderate level every time one drinks in next three months among high risk drinkers

Predicted values for intention in next three months among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

Intention to Limit Alcohol Consumption in Next Twelve Months

Regarding the ***Essay Affirm After x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming the most important value after message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in next twelve months, $b = 2.132$, $t(204) = 3.22$, $p = .001$. However, among participants with LSE (-1SD), affirming the most important value after message exposure had no effect, $b_{LSE} = -.666$, $t(204) = -.94$, $p = .351$ (See *Figure 4.20*).

Regarding the ***Scale Affirm Before x self-esteem*** interaction, simple slope analyses showed that among participants with HSE (+1SD), affirming a range of values before message exposure had a positive effect on intention to limit alcohol consumption to the moderate level every time one drinks in next twelve months, $b = 2.041$, $t(204) = 2.92$, $p = .004$. However, among participants with LSE (-1SD) affirming the most important value after message exposure had no effect, $b = -.070$, $t(204) = -.10$, $p = .918$ (See *Figure 4.20*).

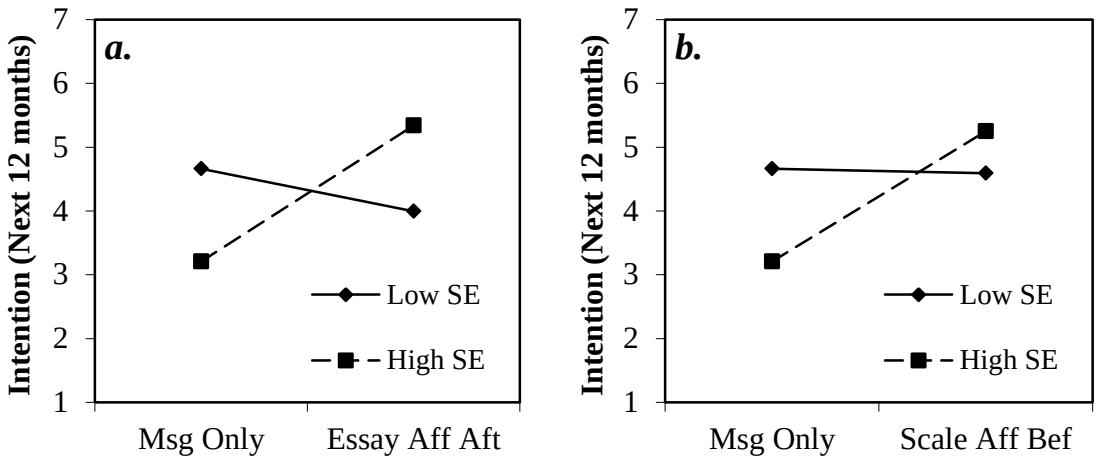


Figure 4.20 Effects of Essay Affirm After x self-esteem and Scale Affirm Before x self-esteem on intention to limit alcohol consumption to the moderate level every time one drinks in next twelve months among high risk drinkers

a. Predicted values for intention in next twelve months among participants in the Essay Affirm After condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

b. Predicted values for intention in next twelve months among participants in the Scale Affirm Before condition and the message only condition with low (1 SD below the mean) and high (1 SD above the mean) levels of self-esteem (SE)

In summary, the above results showed that among high-risk drinkers, compared to their counterparts who only read the message, affirming the most important value after message exposure (i.e., Essay Affirm After), affirming a range of values before message exposure (i.e., Scale Affirm Before), or completing the control task after message exposure (i.e., Control Task After) increased attitude and intention toward limiting alcohol consumption among participants with HSE but not LSE. This finding supported my hypothesis that affirming a range of values before message exposure increases

attitude and intention for people with HSE but not LSE. However, it did not support my hypotheses that affirming the most important value after message exposure decreases attitude and intention for people with HSE but not LSE and that completing a control task before or after message exposure has no differential effects on people with HSE and LSE.

The nature of the above self-affirmation x self-esteem interaction effects among the high-risk drinkers on attitude and intention is consistent with the interaction effects identified on defensiveness and message acceptance with the full sample: regardless of the format and timing, self-affirmation benefited participants with HSE but not LSE. What is surprising is that even completing a control task after message exposure benefited people with HSE but not LSE. There are two areas about these findings that are especially puzzling: (1) timing of self-affirmation did not matter and (2) people with HSE always benefit, even with a control task. In the following sections, I will discuss my tentative explanation for each of them.

Timing of Self-Affirmation

Given the complexity of the study design, a brief recap of the reasoning behind my hypothesis regarding the timing of self-affirmation may help make clear the discrepancies between the results and the hypotheses. I proposed that the timing of self-affirmation in relation to message exposure (i.e., self-affirm before or after message exposure) would determine when self-affirmation reduces defensiveness among people with HSE and LSE, because the timing of self-affirmation would determine whether self-esteem functions as resources or as expectancies (Stone, 1999).

Self-affirming *before* health message exposure enables self-esteem to function as *resources* because self-affirmation brings favorable knowledge about the self into the working memory before the threat to the self occurs. Therefore, those who have more favorable self-knowledge in the working memory (e.g., people with HSE) will be more capable of withstanding the threat than those with less favorable self-knowledge (e.g., people with LSE). The overall pattern of results from Study 3 confirmed this hypothesis: people with HSE benefited from self-affirming before message exposure (i.e., reduced defensiveness, increased message acceptance, attitude, and intention) while people with LSE did not.

Self-affirming *after* health message exposure enables self-esteem to function as *expectancies* because the self-directed attention caused by self-affirmation increases people's sensitivity to self-evaluative information in the message and highlights any discrepancies between one's self-expectancies and one's health-compromising behavior. Therefore, those who hold higher self-expectancies (e.g., people with HSE) will experience greater discrepancies and thus exhibit higher defensiveness than those who hold lower self-expectancies (e.g., people with LSE). The overall pattern of results from Study 3 contradicted this hypothesis: again, people with HSE benefited from self-affirming after message exposure (i.e., reduced defensiveness, increased message acceptance, attitude, and intention) while people with LSE did not.

How, then, dose self-affirming *after* message exposure result in the same differential effects for people with HSE and LSE as self-affirming *before* message

exposure? One possible explanation is that people who self-affirmed after message exposure may have used completing the self-affirmation task as a way to repair their challenged sense of self-integrity after message exposure. The logic is as follows. When the self is threatened, the discomforting implication of the threat for the self will propel the individual to use whatever means that is most readily available to reduce the discomfort and restore a sense of self-integrity (Steele, 1988). Given that the self-affirmation task was presented immediately after message exposure and that the task was designed to focus participants' minds on their positive knowledge of themselves, the self-affirmation task may have provided an excellent venue for participants to restore their sense of self-integrity by reminding themselves that they are doing well in other domains of life. Therefore, because their sense of self-integrity is restored, the discomfort subsided, and the need to engage in defensive processing reduced.

If this is the case, we should expect participants in the self-affirmation *after* message exposure conditions to cast themselves in a more favorable light when responding to the self-affirmation tasks than participants in the self-affirmation *before* message exposure conditions. This speculation is based on previous research that when people's positive views about themselves are questioned, they tend to enhance the positivity of their alternative personal qualities or traits to compensate for the threat to the self (e.g., Baumeister, 1982; Brown & Smart, 1991), a phenomenon known as compensatory self-enhancement (Baumeister & Jones, 1978). People with HSE are found to be more likely to use compensatory self-enhancement as a strategy to cope with threat

to the self (e.g., Boney-McCoy, Gibbons, & Gerrard, 1999; Brown & Gallagher, 1992; Crocker at al., 1987).

To test whether participants in the self-affirmation after message exposure conditions engaged in compensatory self-enhancement during the self-affirmation task, I compared participants' responses to the scale self-affirmation task[7] between scale affirmation before and after message exposure conditions. If participants in the scale affirmation after message exposure condition used the opportunity to complete the value scale as a way to compensate for the blow to the self caused by the health message, they would express higher average agreement with the ten value statements than their counterparts who completed the value scale before message exposure. I thus computed the mean of each participant's responses to the value scale (M = 5.95, SD = .72) and compared the mean levels between participants who completed the value scale before and after message exposure.

Analysis with the full sample showed that the difference on the average agreement with the value statements between those who scale affirmed after message exposure (M = 6.05, SD = .72) and those who scale affirmed before message exposure (M = 5.84, SD = .70) was not statistically significant but was in the hypothesized direction, d = .29, $t(118) = 1.58$, p = .116. Among the high-risk drinkers, however, the difference was substantial: participants who completed the scale affirmation task after message exposure showed much higher average agreement with the value statements (M = 6.21, SD = .59)

[7] The self-affirmation scale contained ten positively phrased statements about personal strengths and values. Participants in these two conditions indicated to what degree each of the statements described who they are.

than participants who completed the scale affirmation task before message exposure (M = 5.55, SD = .70), d = 1.01, $t(59) = 3.97$, p = .000. This means that participants in the self-affirmation after message exposure condition, particularly the high-risk drinkers to whom the health message was most threatening, might have engaged in compensatory self-enhancement to restore their sense of self-integrity.

To test whether high-risk drinkers with HSE were more likely to engage in compensatory self-enhancement through the scale affirmation task after message exposure than high-risk drinkers with LSE, a regression analysis was conducted with high-risk drinkers' average agreement of the scale affirmation value statements as the dependent variable. Mean-centered self-esteem and dummy-coded timing condition were entered at step 1 and the interaction term of self-esteem x timing was entered at step 2. The analysis showed no interaction between self-esteem and timing on high-risk drinkers' average agreement of the value statements ($\Delta R^2_{\text{Step 2}}$ = .004). There was a main effect of self-esteem ($R^2_{\text{Step 1}}$ = .368, b = .243, $t(57) = 3.80$, p = .000) and a main effect of timing (b = .534, $t(57) = 3.50$, p = .001).

In conclusion, it is reasonable to suggest that self-affirming after message exposure resulted in the same differential effects for people with HSE and LSE as self-affirming before message exposure is because participants in the self-affirmation after message exposure condition, particularly the high-risk drinkers, might have engaged in compensatory self-enhancement through the self-affirmation task to restore their sense of

self-integrity. This compensatory self-enhancement might have reduced the discomfort induced by the threatening message and thus reduced the need for defensive processing.

High Self-Esteem and the Control Task

How do we interpret the finding that completing a control task achieved similar effects as the self-affirmation tasks for people with HSE? I speculate that this is because people with HSE are more adept in finding ways to repair the sense of self-integrity when it is threatened. The control task in this study asked participants to recall buildings on a route they travel regularly. Although did not explicitly reverence the self, drawing attention to something that has been a familiar part of their lives may still be self-focusing and therefore may have made certain types of knowledge about the self accessible. Because people with HSE have more favorable knowledge about themselves, even though only a small portion of it were made salient by the control task, they may still have more salient favorable knowledge about themselves to use to buffer threat than people with LSE. This may explain why completing a control task before message exposure benefited people with HSE but not LSE.

Additionally, as discussed earlier that people tend to engage in compensatory self-enhancement when their favorable views about themselves are challenged. Because the control task was framed as designed to examine how easy people find it to recall items they are familiar with, people with HSE might have used this task as a way to demonstrate they have good memory, which might have served the purpose of

compensatory self-enhancement and helped restoring the sense of self-integrity and hence reduced the need for defensive processing.

Discussion

Effects of Affirming the Most Important Value before or after Message Exposure

It was hypothesized that affirming the most important value before message exposure would decrease defensiveness (and increase message acceptance, attitude, and intention) for people with LSE but not HSE, while affirming the most important value after message exposure would increase defensiveness (and decrease message acceptance, attitude, and intention) for people with HSE but not LSE.

Results showed that ***affirming the most important value after message exposure*** (i.e., Essay Affirm After) benefited people with HSE but not those with LSE. Compared to their counterparts who only read the health message, people with **HSE** who affirmed the most important value after message exposure showed ***lower*** psychological discomfort and message skepticism, ***higher*** perceived personal heart disease risk due to excessive drinking, and ***higher*** perceived convincingness and perceived pleasantness of the message, while people with **LSE** who affirmed the most important value after message exposure showed ***higher*** psychological discomfort, ***lower*** perceived personal heart disease risk, and ***lower*** perceived pleasantness of the message.

This means that contrary to my hypothesis, affirming one's most important value after message exposure decreased defensiveness and increased message acceptance

among people with HSE but increased defensiveness and decreased message acceptance among people with LSE. Although these findings did not support my hypothesis, they are consistent with the proposition that self-esteem functions as resource and that self-affirmation enlarges the disparities between people with HSE and those with LSE, but are inconsistent with proposition that self-esteem functions as expectancies and that self-affirmation highlights discrepancies.

The same result pattern emerged among participants who ***affirmed the most important value before message exposure*** (i.e., Essay Affirm Before), but it was limited to two outcome variables: perceived personal heart disease risk and perceived convincingness of the message. Compared to their counterparts who only read the message, participants with **LSE** who affirmed the most important value before message exposure showed ***lower*** perceived personal heart disease risk while participants with HSE showed no change. Additionally, participants with **HSE** who affirmed the most important value before message exposure showed ***higher*** perceived convincingness of the message, while participants with LSE showed no change, compared to their counterparts who only read the message.

This finding contradicted my hypothesis that affirming the most important value before message exposure decreases defensiveness (and increases message acceptance, attitude, and intention) among people with LSE but not HSE. However, it is again consistent with the proposition that self-esteem functions as resource and that self-affirmation enlarges the disparities between people with HSE and those with LSE, but is

inconsistent with proposition that self-esteem functions as expectancies and that self-affirmation highlights discrepancies.

Effects of <u>Affirming a Range of Values</u> before or after Message Exposure

It was hypothesized that affirming a range of values before message exposure would decrease defensiveness (and increase message acceptance, attitude, and intention) for people with HSE but increase defensiveness (and decrease message acceptance, attitude, and intention) for people with LSE, while affirming a range of values after message exposure would increase defensiveness (and decrease message acceptance, attitude, and intention) for people with HSE but not for people with LSE.

The results showed inconclusive evidence partially supporting this hypothesis. Compared with participants who only read the health message, ***affirming a range of values before message exposure*** (i.e., Scale Affirm Before) ***increased*** perceived convincingness of the message among people with **HSE** but not among people with LSE. However, unexpectedly, ***affirming a range of values after message exposure*** (i.e., Scale Affirm After) ***decreased*** perceived personal heart disease risk (in other words, increased defensiveness) among people with **LSE** but not among people with HSE, compared to participants who only read the health message.

This means that affirming a range of values ***before*** message exposure can increase message acceptance among people with **HSE** while affirming a range of values ***after*** message exposure can increase defensiveness among people with **LSE**. Although did not fully support my hypothesis, these findings are again consistent with the they are

consistent with the proposition that self-esteem functions as resource and that self-affirmation enlarges the disparities between people with HSE and those with LSE, but are inconsistent with proposition that self-esteem functions as expectancies and that self-affirmation highlights discrepancies.

Effects of <u>Completing a Control Task</u> before or after Message Exposure

It was hypothesized that compared to participants with HSE or LSE who only read the health message, participants with HSE or LSE who completed a control task (i.e., recalling buildings) *before* or *after* message exposure should not differ in their defensiveness toward the message, their message acceptance, or their attitude or intentions regarding limiting alcohol consumption to the moderate level.

The results largely supported the hypothesis. Completing a control task before or after message exposure had no differential effects between participants with HSE and LSE on all but two dependent variables. Completing a control task ***after*** message exposure ***increased*** perceived personal risk and perceived convincingness for participants with **HSE** but not for people with LSE.

In summary, across self-affirmation and timing conditions, the results showed that consistent with the self-esteem as resource proposition, self-affirmation enlarged the disparities between people with HSE and those with LSE in terms of defensiveness and message acceptance: self-affirmation decreased defensiveness and increased message acceptance among people with HSE but increased defensiveness and decreased message acceptance among people with LSE (See *Table 4.25*).

Table 4.25 Summary of Study 3 Findings

Hypotheses	Results	
Affirm the most important value		
Before message exposure:	Compare Essay Aff Bef condition & Msg Only condition	
	Completing essay affirmation before message exposure:	
· ***Decreases*** defensiveness among people with **LSE** but ***not*** among people with **HSE**	Not supported (Contradicted)	· ***Decreased*** message skepticism regardless of self-esteem level · ***Decreased*** perceived personal heart disease risk among people with **LSE** but ***not*** among people with **HSE**
· ***Increases*** message acceptance among people with **LSE** but ***not*** among people with **HSE**	Not supported (Contradicted)	· ***Increased*** perceived convincingness among people with **HSE** but ***not*** among people with **LSE**
· ***Increases*** attitude and intention toward daily flossing among people with **LSE** but ***not*** among people with **HSE**	Not supported	· ***No change*** in attitude or intention
After message exposure:	Compare Essay Aff Aft condition & Msg Only condition	
	Completing essay affirmation after message exposure:	
· ***Increases*** defensiveness among people with **HSE** but ***less so*** among people with **LSE**	Not supported (Contradicted)	· ***Decreased*** psychological discomfort among people with **HSE** but ***increased*** it among people with **LSE** · ***Decreased*** message skepticism among people with **HSE** but ***not*** among people with **LSE** · ***Increased*** perceived personal heart disease risk among people with **HSE** but ***decreased*** it among people with **LSE**

		· ***Decreased*** anger regardless of self-esteem level
· ***Decreases*** message acceptance among people with **HSE** but ***less so*** among people with **LSE**	Not supported (Contradicted)	· ***Increased*** perceived convincingness among people with **HSE** but not among people with **LSE** · ***Increased*** perceived pleasantness among people with **HSE** but ***decreased*** it among people with **LSE**
· ***Decreases*** attitude and intention among people with **HSE** but ***less so*** among people with **LSE**	Not supported	· Among high risk drinkers, ***increased*** attitude and intention among people with **HSE** but not among people with **LSE**
Affirming a range of values		
Before message exposure:	Compare Scale Aff Bef condition & Msg Only condition	
	Completing scale affirmation ***before*** message exposure:	
· ***Decreases*** defensiveness among people with **HSE** but ***increases*** it among people with **LSE**	Not supported	· ***Decreased*** anger, message skepticism, and message derogation regardless of self-esteem level
· ***Increases*** message acceptance among people with **HSE** but ***decreases*** it among people with **LSE**	Partially supported	· ***Increased*** perceived convincingness of the message among people with **HSE** but ***not*** among people with **LSE**
· ***Increases*** attitude and intention among people with **HSE** but ***decreases*** them among people with **LSE**	Partially supported	· ***Increased*** intention regardless of self-esteem level · Among high risk drinkers, ***increased*** attitude and intention among people with **HSE** but not among people with **LSE**
After message exposure:	Compare Scale Aff Aft condition & Msg Only condition	

	Completing scale affirmation ***after*** message exposure:	
· ***Increases*** defensiveness among people with **HSE** but ***not*** among people with **LSE**	Not supported (Contradicted)	· ***Decreased*** perceived personal heart disease risk slightly among people with **LSE** but not among people with **HSE**
· ***Decreases*** message acceptance among people with **HSE** but ***not*** among people with **LSE**	Not supported	· ***No change*** in message acceptance indicators
· ***Decreases*** attitude and intention among people with **HSE** but ***not*** among people with **LSE**	Not supported	· ***No change*** in attitude or intention
Complete a control task Before or after message exposure:	Compare Ctrl Task conditions & Msg Only condition	
· ***No change*** in defensiveness among people with **HSE** or **LSE**	Partially supported	· Completing a control task ***after*** message exposure, ***increased*** perceived personal heart disease risk slightly among people with **HSE** but ***decreased*** it slightly among people with **LSE** · ***No change*** in other defensiveness indicators
· ***No change*** in message acceptance among people with **HSE** or **LSE**	Partially supported	· Completing a control task ***after*** message exposure, ***increased*** perceived convincingness among people with **HSE** but ***not*** among people with **LSE** · ***No change*** in perceived pleasantness or perceived relevance
· ***No change*** in attitude or intention among people with **HSE** or **LSE**	Partially supported	· Among high risk drinkers, ***increased*** attitude and intention among people with **HSE** but not among people with **LSE**

Conclusion

Study 3 showed that, regardless of the format and the timing, self-affirmation decreased defensiveness, increased message acceptance, attitude, and intention among people with HSE but increased defensiveness and decreased message acceptance among people with LSE. These effects were most pronounced among high-risk drinkers to whom the health message would be most personally relevant and threatening. These findings are consistent with the ***self-esteem as resource*** view (Steele, Spencer, & Lynch, 1993) that self-affirmation makes positive knowledge about the self salient and that people with HSE who have more positive knowledge will benefit while people with LSE who have less positive knowledge will not.

Although the pattern of the differential self-affirmation effects on people with HSE and LSE is similar between self-affirming *before* and *after* message exposure, these effects might have resulted from two different mechanisms. Self-affirming before message exposure might have exerted influence by making the person aware of other positive knowledge about the self and thus securing his or her sense of self-integrity, which in turn lead to lower threat experienced from message exposure, whereas self-affirming after message exposure might have exerted influence by providing the person an opportunity of compensatory self-enhancement that restored the sense of self-integrity and reduced the discomfort caused by the threat from the message exposure.

CHAPTER 5: GENERAL DISCUSSION

It is concerning that people often ignore or reject accurate and well-intended health messages that inform them about their health risks and encourage them to take positive actions. While the prevalence of this so-called defensive processing of health messages is well-documented, ways to mitigate it are not well-understood. A promising line of research guided by the self-affirmation theory (Steele, 1988) suggests that the resistance to personally relevant health messages is driven by the fundamental human motive to protect a sense of self-integrity. If people are given an opportunity to secure the sense of self-integrity through reflecting on unthreatened, cherished values or personal attributes (i.e., a self-affirmation manipulation), they may look beyond the parts of the self that they feel threatened by the message and process the beneficial health information more open-mindedly. Although there is cumulating evidence suggesting that self-affirmation manipulations can reduce defensive processing, increase message acceptance, and improve the uptake of positive actions, the documented effects are small and not universal (e.g., Cohen & Sherman, 2014; Epton, et al., 2015). The small effect sizes and inconsistencies call for more research on the potential moderators of self-affirmation effects.

Responding to this call, this dissertation research tested whether people's strength of self-esteem moderates self-affirmation effects on health message processing. Three experimental studies were conducted to examine when self-affirmation benefits people with high versus low levels of self-esteem.

Summary of Findings

Study 1 (Chapter 2): Domain of Self-Threat

Study 1 tested whether the proposition that self-esteem functions as resources and that self-affirmation enlarges the disparities between people with high and low levels of self-esteem (Steele, Spencer, & Lynch, 1993), applies in a health communication context where an autonomy threat is induced by a health message with controlling language. The results showed that self-esteem moderated self-affirmation effects on message processing. Contrary to the self-esteem as resources hypothesis' direction, self-affirmation increased the willingness to acknowledge experiencing threat (measured through psychological discomfort), self-directed negative emotions, sunscreen use attitude, and intention among participants with LSE, but decreased them among participants with HSE.

Study 2 (Chapter 3): Adequacy of the Affirmed Self

Study 2 tested whether the adequacy of the affirmed self, i.e., the extent to which self-affirmation manipulation secured participants' sense of self-integrity, determines when people with HSE versus LSE benefit from a self-affirmation manipulation. Three self-affirmation conditions that would vary for people with HSE and LSE in terms of the adequacy of the affirmed self were used. Supporting my hypothesis, the results showed that affirming a range of values, which arguably is a self-affirmation manipulation that will not secure a sense of self-integrity for people with LSE, increased perceived manipulation among people with LSE but not HSE. However, inconsistencies emerged

when it comes to self-affirmation effects on intention. Particularly, affirming a range of values decreased daily flossing intention for people with HSE but not LSE. The two essay affirmation conditions did not lead to differential effects for people with HSE and LSE.

Study 3 (Chapter 4): Timing of Self-Affirmation

Study 3 tested whether inducing self-affirmation *before* versus *after* the onset of a threat to the self (i.e., health message exposure) determines whether self-esteem functions as *resources* or functions as *expectancies* and produces differential effects for people with HSE and LSE. Regardless of the timing in relation to message exposure, self-affirmation decreased defensiveness, increased message acceptance, attitude, and intention to limit alcohol consumption among people with HSE but increased defensiveness and decreased message acceptance among people with LSE. These effects were most pronounced among high-risk drinkers to whom the health message would be most personally relevant and threatening.

Making Sense of the Findings

The findings across three studies suggest that individuals' strength of self-esteem can moderate self-affirmation effects on health message processing: people with HSE and LSE may respond differently to self-affirmation based health communication interventions in certain situations. However, given the evident inconsistencies across the three studies, I cannot yet reach a clear conclusion regarding when and through what

mechanisms self-affirmation benefits people with HSE versus LSE. Nonetheless, or perhaps because of this, the findings underscore the importance of continued exploration of the boundary conditions of self-affirmation effects. Particularly, more research is needed to understand how individual differences factors might inform when self-affirmation manipulations reduce defensiveness towards personally-relevant health messages and determine the effectiveness of self-affirmation based health communication interventions. In the following sections, I will discuss the implications and limitations of the present research and specify future directions.

Self-Esteem x Self-Affirmation Interaction Effects

Study 1

Study 1 set out to test whether the proposition that self-esteem functions as resources and that self-affirmation reduces defensiveness among people with HSE but increases it among people with LSE (Steele, Spencer, & Lynch, 1993), applies in a health message processing context. Study 1 showed that self-affirmation increased the willingness to acknowledge experiencing threat (measured through psychological discomfort), self-directed negative emotions, attitude, and intention among people with LSE, but decreased them among people with HSE. At first glance, the results contradicted the self-esteem as resources proposition. The self-esteem as resources proposition would predict that, because self-affirmation makes people with LSE aware that they lack favorable self-knowledge, which makes the situation more threatening to the self, people with LSE would feel more motivated to resolve the threat through

defensive processing as that is the most promising solution at hand to restore self-integrity.

In Study 1, there was no clear evidence that self-affirmation increased defensiveness among people with LSE. But, self-affirmation did make people with LSE experience more discomfort (e.g., feeling uncomfortable, bothered, and uneasy) and feel worse about themselves (e.g., feeling guilty, disappointed at oneself, and annoyed with oneself) after message exposure. This is in fact consistent with the prediction of the self-esteem as resources proposition that people with LSE may feel more threatened after self-affirmation because of being aware of their lack of self-resources. However, interestingly, feeling worse about oneself did not motivate people with LSE to be more defensive; rather, self-affirmed people with LSE showed higher intention to engage in the recommended behavior to control the risk.

A similar finding in previous research is that self-affirmation increased the experience of anticipated regret in response to a health message and led to higher intentions and actual behavior changes (van Koningsbruggen et al, 2014). The authors argue that self-affirmation may provide a strategy to enable people to experience negative emotions without becoming defensive, and consequently engage in "danger control" activities (Witte, 1992) instead of maladaptive responses (e.g., "fear control"; Witte, 1992). If this is the case, the present finding may imply that this beneficial effect of self-affirmation is more pronounced among people with LSE who are more prone to experience negative emotions in response to personally relevant health messages.

Study 2

Study 2 set out to test whether the type of self-affirmation manipulation would influence the adequacy of the affirmed self, and determine when people with HSE and LSE benefit from self-affirmation. Partially confirming my hypothesis, the scale affirmation manipulation (i.e., affirming a range of values), which was expected to be unable to secure a sense of self-integrity for people with LSE, increased perceived manipulation among people with LSE. This supported the self-esteem as resource proposition that people with LSE who lack positive self-knowledge would display stronger defensiveness after self-affirmation. However, the result that scale affirmation decreased daily flossing intention for people with HSE, contradicted the prediction that people with HSE would express lower defensiveness and hence higher message acceptance, attitude, and intention. This is puzzling, because for people with HSE, affirming a range of values would remind them of their abundant favorable self-knowledge and should thus render the threat from the message less provoking. So, what caused the decrease in behavioral intentions?

I speculate two possible explanations. Frist, because self-affirmation freed people with HSE from self-evaluative concerns, self-affirmed people with HSE were able to evaluate the message objectively and focus on the quality and the merits of the message (Correll, Spencer, & Zanna, 2004). It is possible that the use of controlling language made the message less realistic and credible. Therefore, for self-affirmed people with HSE, the message became less persuasive. However, this argument is difficult to verify

with the present data as there were no self-affirmation effects on message acceptance measures (e.g., perceived convincingness, perceived pleasantness, and perceived relevance). My second speculation is that self-affirmation may have further elevated the high self-evaluations people with HSE have. As they became content with their sense of self and free from self-evaluative threat, performing the recommended behavior to avoid the potential health risk may seem less urgent. Therefore, lower behavioral intentions were reported.

It is interesting that in the high threat condition, the two essay affirmation manipulations did not produce any differential effects for people with HSE and LSE. In fact, regardless of self-esteem levels, there was no difference on any of the outcomes when the two essay affirmation conditions were compared with each other or when they were compared with the control condition. This is puzzling, because theoretically, directing attention to an aspect of the self that is more important than the one threatened in the message should achieve an adequate sense of self for people with LSE, and the manipulation check confirmed that participants in the essay affirmation 2 condition were the most likely to report that the task made them think about their positive values and things that are important to them. Then, why there were no self-affirmation effects at all? One speculation is that although the essay affirmations did not produce positive effects, they might have prevented the negative effects seen in the scale affirmation condition.

Study 3

Study 3 set out to test whether the timing of self-affirmation manipulation in relation to message exposure (i.e., self-affirm before or after message exposure) would determine when self-esteem function as resources or expectancies and when self-affirmation benefits people with HSE versus LSE. Though not supporting my hypothesis, the patterns of Study 3 findings were very consistent: regardless of the timing and the format of self-affirmation manipulations, self-affirmation benefited people with HSE but not LSE. Specifically, regardless of affirming the most important value or a range of values before or after message exposure, people with HSE showed lower defensiveness, and higher message acceptance than their unaffirmed counterparts. Among high-risk drinkers, self-affirmation also increased attitude and intention towards reduce alcohol consumption. However, self-affirmed people with LSE showed higher defensiveness and lower message acceptance. Among the three studies, this was the only one whose results consistently supported the self-esteem as resource proposition.

It is interesting that self-affirmation after message exposure achieved comparable self-affirmation effects as self-affirming before message exposure. However, as discussed in the supplementary analysis section in Study 3, self-affirming before and after message exposure might have achieved similar beneficial self-affirmation effects for people with HSE through two different mechanisms. Self-affirming before message exposure puts positive self-knowledge in the working memory which can be used to secure a sense of self-integrity when the threat strikes, whereas self-affirming after message exposure

provides people a venue for compensatory self-enhancement which reduces the need to secure self-integrity through responding to the message defensively.

The Distribution of Self-Esteem Scores

To understand the findings regarding self-esteem, we need to address a methodological issue. The self-esteem score distributions of all three study samples were negatively skewed. In each of the three samples, the mean and median self-esteem scores were much higher than the scale midpoint "4" (range: 1 –7), with the Study 2 sample being the most severely skewed among the three (Study 1: *M* = 4.96, *SD* = 1.02, *Median* = 5.00, *Skewness* = -.161; Study 2: *M* = 5.34, *SD* = 1.28, *Median* = 5.65, *Skewness* = -.795; Study 3: *M* = 4.98. *SD* = 1.21, *Median* = 5.20, *Skewness* = -.395). If a measured self-esteem score of "4" truly represents a moderate level of self-esteem, then these skewed distributions imply that all my studies had a sampling issue, that is, people with low levels of self-esteem were heavily under-represented. But, does the conceptual midpoint of the Rosenberg self-esteem scale truly represent a moderate level of self-esteem?

Previous research showed that a negatively skewed self-esteem score distribution is not uncommon for studies using the Rosenberg self-esteem scale. In fact, reviews showed that in most samples, across self-esteem scales, the mean measured self-esteem score was higher than the scale midpoint (e.g., Baumeister, Tice, & Hutton, 1989; Gentile, Twenge, & Campbell, 2010; Schmitt & Allik, 2005), and some even noted that individuals who fail to endorse the items at least at the moderate level are probably

clinically depressed (Blascovich & Tomaka, 1991). Existing studies that examined the moderating role of self-esteem on self-affirmation effects showed similarly skewed self-esteem score distributions. For example, the sample used in Steele, Spencer, and Lynch (1993) study 2 had a median of 40 on a scale ranging from 10 to 50, and the U.K. adult sample used in Düring and Jessop (2015) had a mean score of 2.92 on a scale ranging from 1 to 4 (SD = 0.53). The above evidence suggests that my study samples were comparable with that of previous research in terms of self-esteem score distributions.

Does this mean that we can dismiss the self-esteem score distribution as a concern when interpreting the findings of this research? Not really. The universally skewed self-esteem score distributions question the validity of using measured self-esteem scores to infer individuals' true self-esteem levels. If the scale midpoint does not represent true moderate level of self-esteem, how can we then determine high versus low levels of self-esteem? Baumeister, Tice, and Hutton (1989) suggest that self-esteem reflects people's attitude toward themselves, but because filling out a self-esteem scale involves describing their attitude about themselves to someone else, it is thus intertwined with the individual's self-presentational concerns. Because it is socially desirable to be competent and worthy, if people are motivated to make themselves look better in front of others, they will score themselves more positively than what their true self-evaluations are. Another view on the nature of low self-esteem suggests that people with low self-esteem are low in self-esteem only in a relative sense, that is, in comparison to the very positive way that people with high self-esteem portray themselves (Tice, 1993). People with low

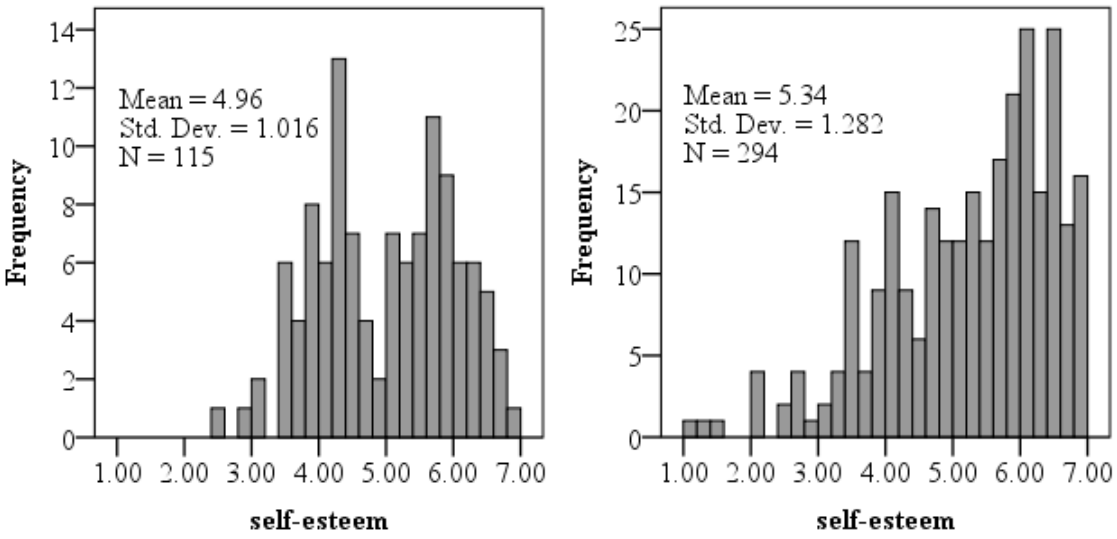
self-esteem are essentially neutral in their self-descriptions, attributing neither strongly positive nor strongly negative traits to themselves (Tice, 1993). Therefore, it is safe to suspect that because of self-presentation concerns, some high self-esteem scores in my samples might came from people with moderate levels of self-esteem, while some moderate self-esteem scores might came from people with low levels of self-esteem.

Nonetheless, without further evidence, I cannot rule out the possibility that the three studies might have suffered from sampling bias: people with low levels of self-esteem were underrepresented in the samples. It is possible that people with low self-esteem are more likely to avoid situations that involve self-focus and self-evaluation because such situations can intensify negative affect, leading to stronger self-criticism and further negative outcomes (Pyszczynski & Greenberg, 1987). Given that the description of my studies indicated that participants will be asked about their opinions on themselves and some of their activities, it is possible that people with low self-esteem were less likely to voluntarily participate in these studies, thus leading to skewed representation of people with low and high levels of self-esteem. If this is the case, we need to use caution when interpreting the findings of this research. First, the low and high levels of self-esteem in this research should be understood in a relative sense rather than in an absolute sense. In the analyses, low self-esteem was operationalized as one standard deviation below the mean self-esteem score, which roughly corresponds to the moderate level on the Rosenberg self-esteem scale (scale midpoint “4”). While the findings about people with HSE may reflect how people with true *high* levels of self-esteem may

respond in self-threatening situations and when self-affirmation may reduce their defensiveness towards personally relevant health messages, the findings about people with LSE may in fact reflect how people with *moderate* levels of self-esteem may respond in self-threatening situations. Second, if we assume that the differences in self-affirmation effects between people with true *high* and *low* self-esteem levels follow a linear pattern, then the differences in self-affirmation effects between people with *high* and *moderate* levels of self-esteem would be about half of the effect size of that between people with *high* and *low* self-esteem levels. This would imply that the adverse effects identified for people with LSE in this research (though truly *moderate* level of self-esteem) would be more severe for people with true *low* levels of self-esteem. However, it is also likely that people with true low levels of self-esteem may respond in qualitatively different ways compared to people with high and moderate levels of self-esteem. If this is the case, then the findings in this research cannot speak for how people with true low levels of self-esteem may respond in self-threatening situations, and when self-affirmation may reduce their defensiveness towards personally relevant health messages.

Even if we accept that the moderate measured self-esteem scores represent low levels of self-esteem, the distributions might still have posed a challenge for identifying self-esteem x self-affirmation interaction effects. As discussed in the supplementary analysis section of Study 2, the statistical power of the interaction test is maximized when both the predictor and moderator variables have half of the observations happen at each extreme and when the extreme values of the predictor variable co-occur with the extreme

values of the moderator variable (McClelland & Judd, 1993). In Study 1 and Study 3, the majority of the scores were between 4 and 6, while in Study 2 the majority of scores were between 5 and 7 (See *Figure 5.1*). The self-esteem score distributions in all three studies have limited the statistical power of the tests. A distribution with observations concentrated at two extremes is difficult to find with measured rather than manipulated variables, therefore, this challenge may exist in all studies that use measured self-esteem scores to test interaction effects.



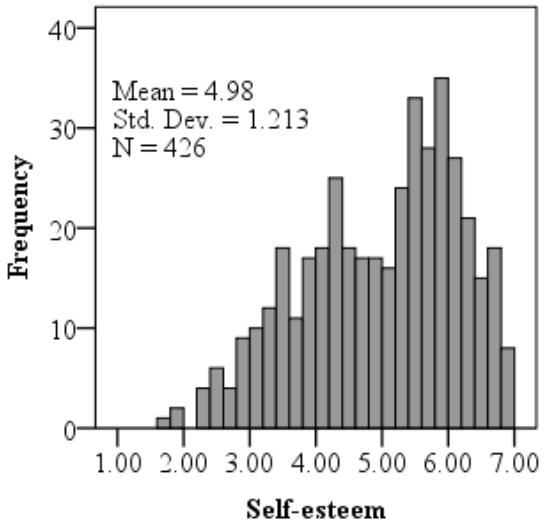


Figure 5.1 Histograms showing the distributions of self-esteem scores in Study 1, Study 2, and Study 3

It is interesting that although both recruited from the same MTurk panel, the Study 2 sample had a more heavily skewed self-esteem score distribution than the Study 3 sample, while the Study 3 sample was quite comparable with that of Study 1. Of all Study 2 participants, 39.5% had a self-esteem score of 6 or higher, while that number for Study 3 and Study 1 were 23.7% and 18.3%, respectively. It is unlikely that Study 2 was more attractive to people with high self-esteem than Study 3, as both studies had a very general title (i.e., health communication study) and description. The only difference in sampling procedures between Study 2 and Study 3 was that in Study 3, people who have completed more than 500 MTurk tasks were prevented from participating, while Study 2 had no such restriction. Therefore, Study 2 might have had a number of professional survey takers who were familiar with the scale. However, I cannot explain why they

would score higher on it. This difference has implications for data collection on anonymous online panels like MTurk. It is important to carefully define the selection criteria and implement data quality control measures. Limiting the number of previous tasks completed may bring you more novices than professional survey takers and thus may provide more natural responses. Embedding simple attention check questions will help identify people who do not pay attention to study instructions.

Main Effects of Self-Affirmation

It is worth noting that the positive main effects of self-affirmation on reducing defensiveness, enhancing message acceptance, attitude, and behavioral intention found in previous research (e.g., Epton et al., 2015) were not consistently found in my studies. In Study 1 and Study 2, the main effects of self-affirmation were sporadic and contradictory. In Study 1, self-affirmation showed negative effects: it increased anger in the high threat condition and reduced attitude in the low threat condition. In Study 2, in the low threat condition, writing an essay about a value less important than "independent (autonomous)" increased sunscreen use intention, but completing the scale affirmation task, however, increased psychological discomfort and anger, and decreased message skepticism and increased perceived relevance. In the high threat condition, completing the scale affirmation task only reduced perceived pleasantness of the message.

In Study 3, however, the main effects of self-affirmation were more frequent and were consistent with previous research. Completing an essay affirmation before message exposure reduced message skepticism and completing an essay affirmation after message

exposure reduced anger. Also, completing the scale affirmation before message exposure reduced anger, message skepticism, and message derogation, and increased intention to reduce alcohol consumption.

The inconsistencies between my studies and the documented positive self-affirming effects in previous research are puzzling. The content analysis of the self-affirmation essays in Study 1 and the manipulation checks in Study 2 and Study 3 showed that my self-affirmation manipulations did what they were supposed to do: focus people's minds on their unthreatened, cherished, positive aspects of the self. Then, why were there barely any positive self-affirmation main effects in Study 1 and Study 2? There are three potential explanations. First, the samples used in Study 1 and Study 2 included people who were at low risk of the health problem, i.e., those who already perform the recommended behaviors, while Study 3 sample only included those who were at moderate to high risk of the health problem. Previous research suggests that people at low risk are less likely to benefit from self-affirmation manipulations compared to people at moderate to high risk (e.g., Harris & napper, 2005; Harris et al., 2007; van Koningsbruggen & Das, 2009). For individuals at low risk, a health message will not pose a threat to the self because they either do not engage in the health-compromising behavior or already perform the recommended protective behavior. Therefore, the message with the health risk information is not personally relevant. Also, because they are taking care of themselves by performing the protective behavior or by not engaging in the health-compromising behavior, they would not experience the dissonance typically

induced by people recognizing they are not as competent as they thought in taking care of their health. Therefore, because there was no threat to the self to begin with, self-affirmation may have been irrelevant, which explains the lack of self-affirmation effects.

Another reason for the null effects of self-affirmation may be that the health risks associated with not performing the recommended behaviors in Study 1 and 2 (i.e., using sunscreen daily, flossing daily) were less threatening than the health risks associated with not performing the recommended behavior in Study 3 (i.e., reducing alcohol consumption). For college student participants in Study 1, the negative consequences of not using sunscreen may not be threatening because there are other behavior alternatives to protect skin from sun overexposure (e.g., stay in shade). Also, because the detrimental health effects of sun overexposure (e.g., skin cancer) usually happen later in life, it may be difficult for young people to conceptualize risks that happen in the distant future. For adult participants in Study 2, getting gum disease due to not flossing daily might have been a health risk they were very familiar with and thus it is not very threatening. Also, participants might have perceived gum disease to be a condition with low threat because, unlike cancer or heart disease, gum disease seldom leads to detrimental consequences. Therefore, because the perceived health risks may be lower, the threats induced by the health messages in Study 1 and 2 may be lower and self-affirmation might have been less relevant. If this is the case, future research may benefit from testing whether self-affirmation effects are contingent on participants' familiarity of the health risks and on the severity of the consequences.

Third, the inconsistencies in the main effects of self-affirmation may be due to the differences in the type of self-threats featured in the health messages. In Study 1 and 2, the health messages not only listed health risk information but also featured high and low levels of autonomy threat manipulated through using controlling (e.g., "Must," "Should," "You don't have a choice.") versus autonomy supporting languages (e.g., "May," "Could," "The choice is yours."). In Study 3, however, the message only featured health risk information. It is possible that the threat to the self caused by the combination of autonomy threat and health risk information was qualitatively different from the threat caused by presenting health risk information only, which may have produced differential self-affirmation effects among people with HSE and LSE. To examine this possibility, future meta-analysis research can test whether previous research's message characteristics, which reflect the types of threat to the self participants would experience, moderate self-affirmation effects.

It is worth mentioning that despite the somewhat rosy picture painted by existing meta-analyses and syntheses about the positive self-affirmation effects, null findings and adverse self-affirmation effects are not difficult to find in previously *published* research. For example, among recent studies, Meier et al. (2015) found that self-affirmation was ineffective in reducing defensive processing or high-risk drinking behaviors among heavy-drinking US college students. Moreover, Zhao et al. (2014) found no positive effects of self-affirmation on most outcome variables among daily smokers and self-affirmation backfired among occasional smokers. Similarly, Mays and Zhao (2016) found

that self-affirmation increased young adult women's indoor tanning intentions and may have done so through producing greater defensiveness toward the indoor tanning prevention messages. The early self-affirmation studies in the health domain had largely relied on college student samples (e.g., Epton & Harris, 2008; Harris & Napper, 2005; Harris et al., 2007; Sherman, Nelson, & Steele, 2000). When research expanded to diverse health topics and when more heterogeneous samples were included, null findings and adverse effects started to pop up. It is possible that the positive effects of self-affirmation on health message processing are not as uniform and robust as previously thought. Therefore, it is important to not dismiss studies with null findings and adverse effects, but to explore alternative explanations and potential moderators of self-affirmation effects.

Directions for Future Research

Given the evident inconsistencies across the three studies, clearly, more research is needed to determine when and through what mechanisms individuals' strengths of self-esteem moderate self-affirmation effects on health message processing. In the following sections, I will identify two areas of future research that may shed light on how self-affirmation benefits people with high and low levels of self-esteem and further our understanding of self-affirmation effects in general.

Internal versus External Self-threats

An area worth exploring concerns the type of threat to the self a health message may induce. As mentioned earlier, I speculate that the different message features in Study

1 and 2 (i.e., controlling language) and in Study 3 (i.e., health risk information) may have induced different self-threats that may responded differently to self-affirmation manipulations. It is possible that the message feature that is most salient to the recipient determines what type of self-threat a message triggers. A health message communicating behavior recommendations through the use of controlling language (e.g., "You must floss everyday") may convey a threat to one's sense of being autonomous (i.e., autonomy threat) while a message emphasizing the negative consequences of an unhealthy behavior (e.g., "smoking greatly increases your risk of cancer") may signal a threat to one's sense of being healthy (i.e., health threat) or being capable of making wise decisions.

The two scenarios, though both prone to induce self-threat and motivate defensive responses, convey different connotations. Specifically, the controlling language aims at urging people to comply with the message's behavioral recommendations; complying with the message's request means relinquishing one's control over decisions to an external figure, which challenges one's idea of being free of outside control on decision-making – this is a self-threat induced by an external source (i.e., external self-threat). In contrast, health risk information makes people realize that one's judgements about health is inaccurate or one's current behaviors might impair their health; accepting the information means admitting that oneself is at fault or is incompetent in accurately evaluating and controlling life outcomes, which contradicts one's idea of being adaptively adequate. This is a self-threat induced by people's own actions (i.e., internal self-threat).

The qualitatively different external and internal self-threats may impact the main effects of self-affirmation and also influence the moderating role of self-esteem in different ways. Specifically, I speculate that in the internal self-threat contexts (e.g., considering health risk information, performed poorly on an exam), self-esteem may function as *resources*, while in the external self-threat context (e.g., reading a message with controlling language, in an upward social comparison situation), self-esteem may function as *expectancies*. Recall that because self-affirmation manipulation focuses people's attention on the self, self-affirmed individuals will attend to a self-relevant health message more readily than unaffirmed individuals and will be more sensitive to the self-threat conveyed in the message. Experiencing temporary elevation of positive self-evaluation while being more sensitive to self-threats may lead to different outcomes when people confront an external versus internal self-threat.

When people confront an external self-threat (e.g., perceiving that a message is trying to restrict one's autonomy on health behavior decisions), self-affirmation would highlight the intrusiveness of the message, if one is highly satisfied with the present self. Given that people in general are reluctant to adjust self-evaluation downwards, in an attempt to protect the elevated positive self-evaluation, self-affirmed people will be more likely to resort to defensive responses, compared to their unaffirmed counterparts. Because people with HSE perceive greater discrepancies between the elevated self-evaluation and the threat than people with LSE, they will be especially more likely to resort to defensive responses.

When people confront an internal self-threat (e.g., recognizing that one's current behaviors are putting one's health at risk), having been assured that one's self-worth is also sustained by sources other than the aspect of self under threat will make the idea that one might be less competent in some domains of the self (e.g. being healthy) more acceptable and ease the self-inflicted discomforting implication for the self. Therefore, it is expected that self-affirmed people, especially those with HSE who are aware that they are adequate in a number of other domains, will be less likely to resort to defensive responses compared to their unaffirmed counterparts.

Mediating Relations

Another area that deserves more attention regards the question how self-affirmation and its moderating factors produces a cascade of effects from immediate affective and cognitive outcomes, such as reducing psychological discomfort and enhancing attentional bias to threatening components of message (Klein & Harris, 2009), to more downstream outcomes, such as perceived message effectiveness and beliefs about the recommended behavior, and eventually to behavior change. Although in this research I tested the self-affirmation x self-esteem effects on three categories of outcomes individually (i.e., indicators of defensiveness, message acceptance, attitude and intention), theoretical arguments can easily be made that there is a causal link between these three categories of outcomes and even between the variables within each category. For example, self-affirmation x self-esteem interaction effects on behavioral intention may be mediated by attitude, which may be mediated by perceived message

convincingness, which may be mediated by message skepticism, which may be mediated by psychological discomfort.

Many previous studies have theorized mediating relations of self-affirmation effects, but few have empirically tested them. Among the few that tested the theorized mediating relations, all of them relied on the statistical approach of mediation analysis, such as the technique proposed by Baron and Kenny (1986). However, relying on measured mediator from a single experimental study and a statistical analysis to study mediation has been criticized as prone to bias, because this approach relies on satisfying a number of assumptions that are difficult to meet (e.g., Green, Ha, & Bullock, 2010; Spencer, Zanna, & Fong, 2005). For instance, one of the requirements is that the mediator is independent of unmeasured factors that affect the outcome. However, situations that meet this requirement are rare in communication research. A simple example of a violation of this assumption would be that both the mediator and the outcome were assessed with similar types of self-report measures, which means that both may be influenced by method bias.

Therefore, to minimize biases in the estimates of mediation effects, future research testing the mediating relations in self-affirmation effects can consider the experimental approaches of mediation analysis instead of the statistical approach (e.g., Green, Ha, & Bullock, 2010; Spencer, Zanna, & Fong, 2005). One such approach is conducting several experimental studies: first manipulate the independent variable and test its effect on the mediator, then manipulate the mediator and test its effect on the

outcome variable. Future research on the mediating relations in self-affirmation effects may benefit form experimental approaches like this, because by manipulating both the independent variable and the mediator, this approach has the advantage of ensure strong inferences about the causal chain of events (Spencer, Zanna, & Fong, 2005).

Conclusion

In conclusion, this dissertation tested whether people's strength of self-esteem moderates self-affirmation effects on health message processing. The findings across three studies suggest that individuals' strength of self-esteem can moderate self-affirmation effects on health message processing: people with HSE and LSE may respond differently to self-affirmation based health communication interventions in certain situations. However, despite the theoretical coherence, evident empirical inconsistencies exist across the three studies. Therefore, at this point, I cannot reach a clear conclusion regarding when self-affirmation benefits people with HSE versus LSE and cannot provide specific suggestions on how self-affirmation should be used in health communication practices. Nonetheless, this research has shown that individuals' self-esteem levels can influence the effectiveness of self-affirmation-based health communication interventions, and sometimes not in a desirable direction. Interventionists therefore should use caution when incorporating self-affirmation elements in health communication interventions as it may have positive effects for some, but weak or even adverse effects among others.

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Appendices

Appendix A. Sample Characteristics

Appendix A.1 Study 1 Sample Characteristics (N = 115)

	Frequency	Percent
Age		
18 – 20	78	67.8
21 – 25	36	31.3
26 or older	1	0.9
Gender		
Male	34	29.6
Female	81	70.4
Race/Ethnicity		
American Indian/Alaska Native	1	0.9
Asian/Asian American	24	20.9
Black/African American	1	0.9
Hispanic/Latino	1	0.9
Multiracial	5	4.3
White/Caucasian	83	72.2

Appendix A.2 Study 2 Sample Characteristics (*N* = 294)

	Frequency	Percent
Age		
18 – 30	119	40.5
31 – 40	56	19.5
41 – 50	45	15.3
51 – 60	43	14.6
61 – 70	29	9.9
71 or older	2	0.1
Gender		
Male	175	59.5
Female	117	39.8
Other	2	0.7

Race/Ethnicity		
Asian/Asian American	13	4.4
Black/African American	22	7.5
Hispanic/Latino	14	4.8
Multiracial	10	3.4
White/Caucasian	235	79.9
Education		
High school (grades 9-12, no degree)	1	0.3
High school graduate (or equivalent)	27	9.2
Some college (1-4 years, no degree)	68	23.1
Associate's degree (including occupational or academic degrees)	26	8.8
Bachelor's degree (BA, BS, AB, etc)	115	39.1
Master's degree (MA, MS, MENG, MSW, etc)	46	15.6
Professional school degree (MD, DDC, JD, etc)	6	2.0
Doctorate degree (PhD, EdD, etc)	5	1.7
Household Income		
Less than $10,000	19	6.5
$10,000 to $14,999	13	4.4
$15,000 to $24,999	53	18.0
$25,000 to $49,999	83	28.2
$50,000 to $99,999	90	30.6
$100,000 to $149,999	29	9.9
$150,000 to $199,999	4	1.4
$200,000 or more	2	0.7

Appendix A.3 Study 3 Sample Characteristics (N = 426)

	Frequency	Percent
Age		
18 – 30	227	53.3
31 – 40	110	25.8
41 – 50	50	11.7
51 – 60	27	6.3

61 – 70	11	2.6
71 or older	1	0.2
Gender		
Male	137	66.9
Female	285	32.3
Other	4	0.8
Race/Ethnicity		
American Indian/Alaska Native	2	0.5
Asian/Asian American	18	4.2
Black/African American	34	8.0
Hispanic/Latino	17	4.0
Native Hawaiian/Other Pacific Islander	1	0.2
Multiracial	19	4.5
White/Caucasian	335	78.6
Education		
High school (grades 9-12, no degree)	3	.7
High school graduate (or equivalent)	35	8.2
Some college (1-4 years, no degree)	130	30.5
Associate's degree (including occupational or academic degrees)	45	10.6
Bachelor's degree (BA, BS, AB, etc)	140	32.9
Master's degree (MA, MS, MENG, MSW, etc)	61	14.3
Professional school degree (MD, DDC, JD, etc)	7	1.6
Doctorate degree (PhD, EdD, etc)	5	1.2
Household Income		
Less than $10,000	35	8.2
$10,000 to $14,999	21	4.9
$15,000 to $24,999	46	10.8
$25,000 to $49,999	129	30.3
$50,000 to $99,999	129	30.3
$100,000 to $149,999	44	10.3
$150,000 to $199,999	15	3.5
$200,000 or more	7	1.6